

North American Deglacial Marine- and Lake-Limit Surfaces Limites des surfaces marines et lacustres de déglaciation en Amérique du Nord

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Résumé de l'article

La surface de la limite marine durant la déglaciation est une topographie virtuelle illustrant l'augmentation des altitudes depuis la déglaciation. Les données disponibles sur l'altitude des limites marines (n = 929), trois fois plus nombreuses que celles publiées dans les synthèses récentes, permettent d'obtenir une surface plus détaillée de la région glaciaire de l'Amérique du Nord et du Groenland. Certaines surfaces lacustres de grande superficie sont similaires aux surfaces marines, sauf que leurs gradients ne sont pas affectés par la remontée du niveau de la mer. Ces surfaces reflètent collectivement la géométrie de la calotte glaciaire ainsi que les taux régionaux et locaux de recul des marges glaciaires. En conséquence, elles constituent d'excellentes cibles additionnelles pour la modélisation glacio-isostatique, étant mieux distribuées que les courbes du niveau marin relatif.

NORTH AMERICAN DEGLACIAL MARINE- AND LAKE-LIMIT SURFACES*

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ABSTRACT The deglacial marine-limit surface is a virtual topography that shows the increase of elevation since deglaciation. The currently available set of marine-limit elevations ($n = 929$), about three times the number available in the most recent synthesis, allows a fairly detailed rendering of the surface across most of glaciated North America and Greenland. Certain large glacial lake-limit surfaces are analogous to marine-limit surfaces, except that their gradients were not dampened by eustatic sea-level rise. Collectively the surfaces reflect both gross ice-sheet geometry and regional to local rates of ice-marginal recession. As such, they are replication targets for glacioisostatic modelling that are supplementary to and more continuously distributed than relative sea-level curves.

RÉSUMÉ *Limites des surfaces marines et lacustres de déglaciation en Amérique du Nord.* La surface de la limite marine durant la déglaciation est une topographie virtuelle illustrant l'augmentation des altitudes depuis la déglaciation. Les données disponibles sur l'altitude des limites marines ($n = 929$), trois fois plus nombreuses que celles publiées dans les synthèses récentes, permettent d'obtenir une surface plus détaillée de la région glaciaire de l'Amérique du Nord et du Groenland. Certaines surfaces lacustres de grande superficie sont similaires aux surfaces marines, sauf que leurs gradients ne sont pas affectés par la remontée du niveau de la mer. Ces surfaces reflètent collectivement la géométrie de la calotte glaciaire ainsi que les taux régionaux et locaux de recul des marges glaciaires. En conséquence, elles constituent d'excellentes cibles additionnelles pour la modélisation glacio-isostatique, étant mieux distribuées que les courbes du niveau marin relatif.

INTRODUCTION

The mapping and altimetry of raised shorelines, both marine and lacustrine, have been standard components of Quaternary studies in glaciated North America since their beginning. The highest shorelines have received particular attention. Several regional to continental summaries of data have appeared as these data became increasingly available and better understood in terms of ice-sheet geometry. However, thirty-five years have now lapsed since the last continental synthesis (Andrews, 1972) and hundreds of additional measurements, about two-thirds of the data, are available. Assembling of these data is not a simple task, because authors rarely report precise locations of measured features and they commonly plot data on maps at scales that make it difficult or impossible to derive accurate co-ordinates. Nevertheless, this paper presents a reasonably complete inventory of available measurements (Appendix), a more detailed and better constrained contour map of marine- and lake-limit elevations, and an interpretation of the map as a reflection of the history of deglaciation. The map, and particularly the primary data that are contoured, should be useful replication targets for glacioisostatic rebound modelling. Some basic concepts are reviewed before presenting and interpreting the marine-limit and lake-limit data.

BACKGROUND

MARINE LIMITS

A marine limit, as used here, is the highest position (latitude, longitude and elevation) reached by the postglacial sea at a site, the elevation being measured with respect to present sea level (Andrews, 1970a). The Earth's crust in heavily glaciated regions was strongly depressed by its load of thick ice, by approximately one-third the ice thickness. Depression extended beyond the ice margin due to crustal stiffness. Although global sea level was lowered during the last glaciation by about 120 m (Fairbanks, 1989; Clark and Mix, 2000), the beds of large ice sheets were depressed by much more than that amount a short distance inside of the ice-sheet limits. Consequently, the sea flooded the depressed areas upon deglaciation. However, crustal uplift due to ice-load removal exceeded global (eustatic) sea-level rise in most areas thereafter, thus causing relative sea level to fall. Therefore, with few exceptions in North America and Greenland, the marine limit is the local position of the sea surface at the time of deglaciation of a site. Hence, the marine limit does not form a synchronous shoreline at a continental or even at a regional scale. Rather, it varies in age almost as widely as does the timing of deglaciation. Known marine-limit shoreline features in North America thus range in age from about 14 500 ^{14}C BP to about 4000 ^{14}C BP (Dyke, 2004a).

Marine-limit ages do not span the full range of postglacial time. Where deglaciation occurred shortly after the last glacial maximum, crustal uplift initially caused emergence (Fig. 1, curves C, H, J). However, the net postglacial (eustatic) sea-level rise (ca. 120 m; Fig. 1, curve B) exceeded that initial emergence, leaving these earliest deglacial shorelines below present sea level just inboard of the glacial limit. There are thus no

postglacial shorelines higher than present sea level in the area from New Jersey to the Atlantic coast of Nova Scotia, where deglaciation occurred between 18 000 and 14 500 ^{14}C BP. Similarly, all postglacial shorelines apparently are below present sea level in the area between the Yukon coast and western Amundsen Gulf, where deglaciation occurred between 18 000 and 12 000 ^{14}C BP. Areas deglaciated after these times have

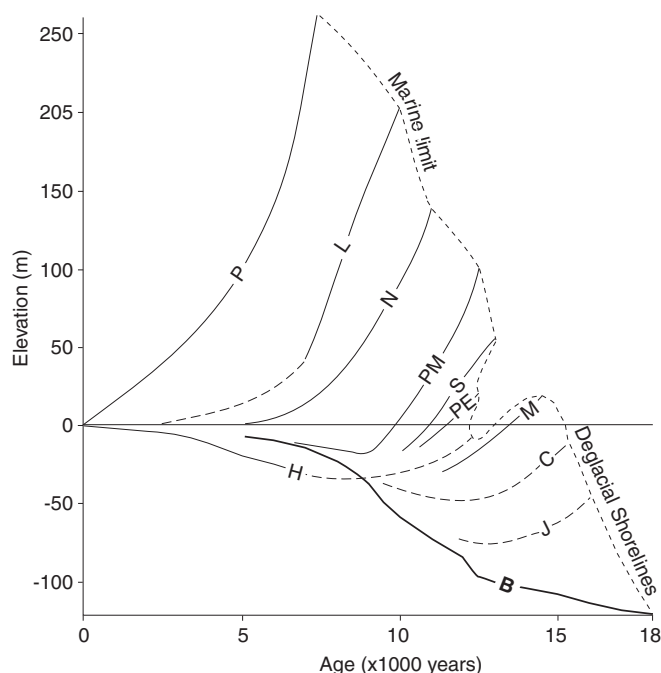


FIGURE 1. The relationship between the present elevation of a shoreline formed at the time of deglaciation and the relative sea-level history of a site. Where the deglacial shoreline is above present sea level, it is referred to as the marine limit. Shown are approximate (Dyke, unpublished relative sea-level database) and hypothetical (dashed lines) relative sea-level curves for (P) Poste-de-la-Baleine, southeast Hudson Bay, at the postglacial uplift centre, and a sequence of curves for sites progressively closer to the limit of glaciation (less isostatically depressed): (L) Lac Saint-Jean, Québec, (N) St. Anthony, Newfoundland, (PM) Portland, Maine, (S) St. John's, New Brunswick, (PE) northwestern Prince Edward Island, (H) Halifax, Nova Scotia, (M) Boston, Massachusetts, (C) southern Connecticut, (J) New Jersey, and (B) Barbados (Fairbanks, 1989). Relative sea-level rise at Halifax during the last 7000 years has exceeded the eustatic sea-level rise at Barbados because of crustal subsidence due to collapse of the glacioisostatic forebulge, which migrates inward as the radius of the area of postglacial uplift shrinks.

Relation entre l'altitude actuelle de la ligne de rivage formée au cours de la déglaciation et l'historique du niveau marin relatif d'un site. Dans les cas où le trait de côte durant la déglaciation est au-dessus du niveau marin actuel, on y réfère comme étant la limite marine. Les courbes du niveau marin relatif illustrées sont soit approximatives (Dyke, base de données non publiée du niveau marin relatif), soit hypothétiques (lignes pointillées) pour (P) Poste-de-la-Baleine, le sud-est de la Baie d'Hudson, au centre du soulèvement post-glaciaire, et pour une séquence de courbes pour des sites progressivement plus proches de la limite glaciaire (moins déprimées isostatiquement) : (L) Lac Saint-Jean, Québec, (N) St. Anthony, Terre-Neuve, (PM) Portland, Maine, (S) St. John's, Nouveau-Brunswick, (PE) nord-ouest de l'Île-du-Prince-Édouard, (H) Halifax, Nouvelle-Écosse, (M) Boston, Massachusetts, (C) sud du Connecticut, (J) New Jersey et (B) Barbade (Fairbanks, 1989).

raised shorelines (Fig. 1, curves M and higher, except for H), because crustal depression, hence rebound, was larger toward the ice-sheet centre and postglacial eustatic sea-level rise (Fig. 1, curve B) was less the later the date of deglaciation.

A marine-limit elevation can be measured only where it is recorded by a shoreline feature, such as a delta, a beach, or an upper limit of wave erosion. Thus, in many places the position of the marine-limit shoreline is undefined, as is typical of steep rocky slopes. Probably the chief source of error in our current compilation of marine-limit elevations is the misinterpretation of a high shoreline feature in an area as a marine limit, where the true limit lies higher but may be weak or not detectible. It is also possible to overestimate marine-limit elevations, as where marine sediments or fossils are glacially thrust or redeposited above the contemporaneous sea level. Note that our definition of marine limit differs from some earlier ones, which, for example, define it as the "highest evidence in the form of a marine/littoral deposit or erosional form, such as a wave-cut terrace, reached by the sea in areas affected by glacioisostatic loading and unloading..." (Andrews, 1973), because we wish to emphasize that the highest "evidence" does not necessarily represent the true marine limit. Fortunately, many marine-limit shoreline features are unambiguous, such as ice-contact deltas (built at the receding glacier margin and graded to sea level of the time) and outwash sediment or meltwater channels that terminate at a raised beach. Andrews (1970a) provides a discussion of criteria for recognizing the marine limit in the field as do many regional geological reports. Because the marine limit is a fundamental and powerfully informative feature of regional Quaternary geology, numerous investigators have focussed on properly identifying and surveying it and we consequently now have a large body of information pertaining to it.

The known exceptions, where marine inundation occurred after, rather than precisely at the time of, deglaciation in Canada (see above), are as follows: (1) In James Bay and along the south shore of Hudson Bay, the ice front retreated northward in glacial Lake Agassiz-Ojibway to a position north of the subsequent marine-limit shoreline. When the sea later flooded in from the north, it thus formed the marine-limit shoreline synchronously across the entire southern part of Hudson basin (Dredge and Cowan, 1989; Veillette, 1994; Clarke *et al.*, 2004; Dyke, 2004a). (2) Similarly, in the St. Lawrence and Ottawa valleys the ice front retreated northward in a proglacial lake. When the sea flooded in from the Gulf of St. Lawrence, it formed a synchronous shoreline south of the contemporaneous ice front (Occhietti *et al.*, 2001). (3) On the Queen Charlotte Islands of British Columbia, deglacial shorelines are far below present sea level. The sea then rose from -150 m to a maximum of about 16 m elevation well after deglaciation (Clague *et al.*, 1982; Clague, 1989; Josenhans *et al.*, 1997). Relative sea level has subsequently fallen due to tectonic, as opposed to glacioisostatic, uplift (Clague *et al.*, 1982). The Queen Charlotte Islands marine-limit data are not considered here, because they are not of deglacial age. The Hudson Bay and St. Lawrence-Ottawa data are shown, because marine-limit shorelines formed there within a century or two after deglaciation. Nevertheless, in these two regions where the marine limit forms a synchronous shoreline, the marine-limit surface is steeper than it would have been had it formed diachronously.

Isolines or profiles drawn through marine-limit elevations define a virtual topography, which we here call the marine-limit surface (Fig. 2). That surface is everywhere a direct measure of the net change of elevation since deglaciation, regardless of whether a site is at the coast, inland, or offshore. The surface is the net result of two opposing variables that determine relative sea-level history: (1) the amount of depression of Earth's crust by the ice sheets during the last glaciation, and (2) the amount of uplift (emergence plus eustatic sea-level rise) that occurred prior to deglaciation. The depression varied spatially from nil to an order of 10^3 m, being about one-third of ice thickness. Postglacial emergence was initially rapid, with a half-time of 1000-2000 years at most sites (Dyke and Peltier, 2000). Therefore, the marine-limit surface reflects both gross ice-sheet geometry in its overall form, and the rates of ice recession in its details (Fig. 2). Note on this figure that the marine-limit gradient is always less than the gradient of any contemporaneous shoreline in its vicinity although it approaches the shoreline gradient as the rate of ice recession increases, as shown for the interval 9000 to 8000 BP. When ice recession is relatively slow, as shown for the interval 11 000 to 10 000 BP, the marine-limit surface dips in the direction opposite to that of the shorelines. This is referred to as a negative marine-limit gradient (dipping toward the ice-load centre), all others being positive or zero. Had the ice margin readvanced between 11 000 and 10 000 BP to the position shown by the open vertical bar on the 10 000 BP shoreline, a cliff with a negative gradient of 90° would have been formed on the marine-limit surface, as indicated by the vertical dashed line.

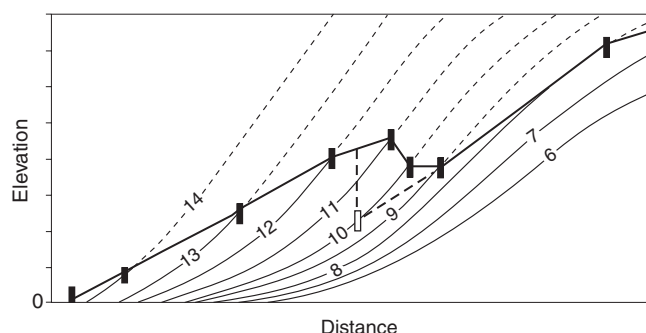


FIGURE 2. The schematic relationship between raised shoreline gradient, marine limit gradient, and rate of ice marginal recession. Numbered solid lines are the profiles of hypothetical raised shorelines with the numbers indicating age in thousands of years. Thick vertical bars represent ice margins. The open bar represents a stillstand or readvance of the ice margin. Dashed extensions of the shoreline profiles represent the increase in elevation of the glacier bed since the times indicated. The heavy line connecting ice marginal positions is the marine-limit surface.

Relation schématique entre le gradient des lignes de rivages, le gradient des limites marines et le taux de récession des marges glaciaires. Les lignes numérotées représentent les profils hypothétiques des lignes de rivage soulevées, les chiffres indiquant l'âge en milliers d'années. Les barres verticales représentent les marges glaciaires et la barre vide représente un arrêt ou une avancée de la marge glaciaire. Les pointillés représentent l'augmentation de l'altitude du lit glaciaire depuis le temps indiqué. La ligne épaisse reliant la position des marges glaciaires délimite la surface marine.

LAKE LIMITS

The maximum water levels that occurred in large glacial lakes as ice fronts retreated across their basins define lake-limit surfaces. These are similar to the marine-limit surface as long as the lake used the same outlet, the outlet was not substantially lowered by erosion, and the outlet was located at the least uplifted end of the lake. All other outlet positions would cause shoreline transgressions ice-distal from the outlet. In other words, had the sea invaded the glacial lake basin, the marine-limit isolines would have trended parallel to the lake-limit isolines, although the marine-limit isolines would have been lower (Fig. 3). According to published interpretations, these conditions pertain to glacial Lake McConnell and Lake Mackenzie in the Mackenzie River drainage basin (Smith, 1992, 1994), to the Ojibway phase of glacial Lake Agassiz-Ojibway (Veillette, 1994), and to glacial Lake Hitchcock in the Connecticut River valley in New England (Koteff *et al.*, 1993).

There is, however, a difference between a lake-limit surface and a marine-limit surface. Although both were affected equally in neighbouring localities along the same isobase by the isostatic uplift that occurred as the ice front retreated, the marine-limit surface was additionally affected by eustatic sea-level rise. Because emergence is isostatic uplift minus eustatic sea-level rise, marine-limit elevations and gradients were reduced by eustatic rise. Although the elevation of a lake basin

was also reduced by eustatic sea-level rise, the tilting of the basin with respect to its outlet was not. The consequence is that for adjacent lake and marine basins, the lake-limit surface should rise more steeply than the marine-limit surface.

Figure 3 compares shoreline and water-limit profiles in adjacent marine and lake basins with identical deglaciation and uplift histories. Part A shows hypothetical emergence curves for site A (curve Ae) and site B (curve Be) and uplift curves for the same sites, adding the eustatic corrections from curve B in Figure 1. Site A, at marine limit, and the outlet sill (A') of the glacial lake have identical uplift histories (part B of Fig. 3). Site B is at marine limit 100 km closer to the uplift centre and it shares an identical uplift history with a site (B') in the lake basin 100 km in the same direction from the outlet. The lower part of part B of Figure 3 shows profiles of the 9, 10, and 11 ka BP shorelines (solid lines labelled 9 and 10) or their projections behind the contemporaneous ice margins (dashed line labelled 11) resulting from curves Ae and Be. It also shows the amount of uplift since 9, 10, and 11 ka BP (lines labelled 9u, 10u, 11u) resulting from curves Au and Bu. The ice front receded across point A at 11 ka BP and across point B at 9 ka BP, with a constant rate of recession during the interim. Thus at the 50-km mark, the 10-ka shoreline is at 25 m. The resulting marine-limit surface (bold line), which starts at 20 m at point A, rises to 25 m at the 50-km mark and intersects the

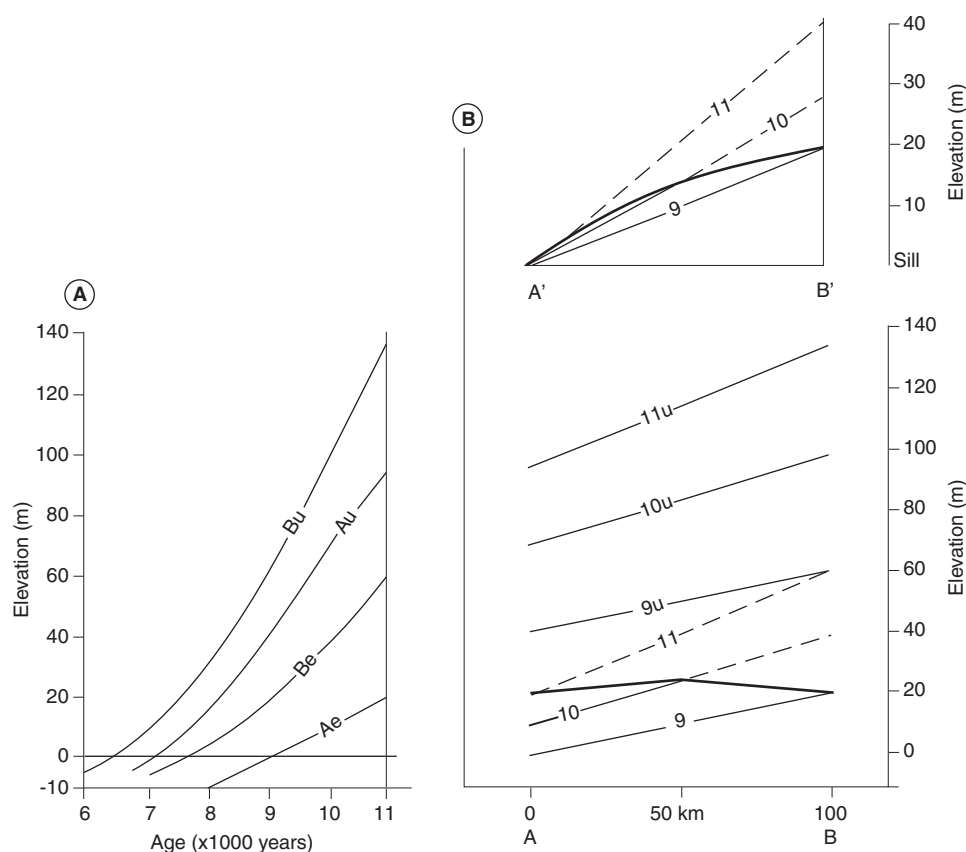


FIGURE 3. Relationship between a lake-limit surface and an adjacent marine-limit surface formed over the same time interval. (A) Emergence (Ae, Be) and uplift (Au, Bu) curves for sites A and B. (B) Site B is 100 km closer to the uplift centre than site A. Sites A and B are at marine limit. Site A' is at a glacial lake outlet sill on same isobase as site A. Site B' is on same isobase as site B. Numbered lines (9, 10, 11) are shoreline profiles; lines labelled 9u etc. show uplift profiles. Heavy lines represent marine-limit (lower) and lake-limit profiles (upper).

Relation entre la surface d'une limite lacustre et celle d'une limite marine adjacente qui a été formée en même temps. (A) Courbes d'émergence et de soulèvement (Au, Bu) pour les sites A et B. (B) Le site B est 100 km plus près du centre de soulèvement que le site A. Les sites A et B occupent la limite marine. Le site A', à l'exutoire d'un lac glaciaire, est sur la même isobase que le site A. Le site B' est sur la même isobase que le site B. Les lignes numérotées (9, 10, 11) sont les profils des lignes de rivage; les lignes identifiées par 9u, etc., représentent les profils de soulèvement. Les lignes épaisses représentent les profils des limites marines (bas) et des limites lacustres (haut).

9-ka shoreline at point B, returning to an elevation of 20 m (positive and negative gradients of 1:10 000). The upper part of part B of Figure 3 (note change of vertical scale) shows lake shoreline profiles for the same times or their projections behind the contemporaneous ice margins (dashed lines). Point B' has been uplifted 40 m more than point A' (lake sill) since 11 ka BP, 28 m more since 10 ka BP, and 20 m more since 9 ka BP, according to curves Au and Bu in part A of Figure 3. The lake-limit surface rises from the sill to intersect the 10-ka shoreline midway between points A and B at 13 m above the sill. It intersects the 9-ka shoreline 20 m above the sill. Therefore, the lake-limit surface is steeper (net rise of 20 m) than the marine-limit surface (net rise 0 m), because only the latter is dampened by eustatic sea-level rise during the interval over which it formed.

It is evident, therefore, that marine-limit and lake-limit topographies are features that need to be reconciled with each other and with the pattern and chronology of deglaciation, on the one hand, and with geophysical models of glacioisostatic adjustment on the other.

PREVIOUS MARINE-LIMIT MAPS

The most recent marine-limit map of Canada was prepared by John Andrews for the National Atlas of Canada using data available as of 1969 (Andrews, 1972; scale 1:30 000 000). The map was also included in a journal article that reviewed previous renderings of marine-limit isolines (Andrews, 1973). The earliest maps recognized a prominent region of maximum emergence over Québec-Labrador or southeastern Hudson Bay and placed the zero isoline over Atlantic Canada and New England with reasonable accuracy (De Geer, 1892; Fairchild, 1918; Daly, 1934). The first continental-scale map, which however excluded the Pacific coast, was by Farrand and Gajda (1962). It was made possible by the great expansion of field observations throughout the Arctic after the second world war, largely by the officers of the Geological Survey of Canada and the former Canadian Geographical Branch (Prest *et al.*, 1968). The map was reasonably accurate in placing centres of maximum emergence in southeastern Hudson Bay and a second centre in the High Arctic, as well as in the values shown there and elsewhere. Also, it illustrated the tilted shorelines of glacial Lake Algonquin in the Great Lakes region and of Lake Agassiz west of there, so as to indicate the limit of the uplifted region and the trend of isobases. The map was unfortunately marred by misleading data (terraces and other features of non-marine origin [Ives, 1963]) from eastern Baffin Island, showing emergence of 150-180 m in regions now known to have emerged by less than 50 m. Andrews (1972) constructed his map for the National Atlas by selecting the maximum recorded marine-limit elevation within each of 125 grid cells, placing these values at the cell centres, and contouring them, thus filtering out lower values. No lake-limit data were used, nor were data from the Pacific coast included.

METHOD

Isolines on the current map are simple objective contours of all available measurements of marine-limit elevations

($n = 929$) for which reasonably accurate co-ordinates are available (Fig. 4; Appendix). Minimum and maximum elevations of marine limits are not knowingly included, because these are not amenable to straightforward contouring. Inland trends of marine-limit isolines, where not guided by lake-limit isolines, are based on the general form of the continental ice sheet. Published statements that geological features represent local marine limits are accepted at face value, as they were in previous syntheses. Primary references are given wherever possible. For several sites, we have retained information from the Glacial Map of Canada (Prest *et al.*, 1968) for which we were unable to identify a primary source. These were probably supplied directly to the authors (Prest *et al.*, 1968) from unpublished field notes, primarily by officers of the Geological Survey of Canada. Data points are not plotted for the lake limits, but these may be found in Koteff *et al.* (1993) for Lake Hitchcock, in Veillette (1994) for Lake Ojibway, in Dredge (1983a) and Klassen (1983) for Lake Agassiz, and in Smith (1992, 1994) for lakes Mackenzie and McConnell. The Hitchcock and Ojibway limits are very well constrained by measurements.

PATTERN

MARINE LIMITS

The zero isoline (Fig. 5) represents the geographical limit of net postglacial emergence. Its position resembles that shown by Andrews (1972) in roughly mimicking the limit of glaciation. It is fixed just south of Boston in the northeastern U.S.A. (Stone and Peper, 1982) and trends across central Nova Scotia (Prest *et al.*, 1968, 1972; Stea *et al.*, 2001) and Prince Edward Island (Prest *et al.*, 1968). The location of the zero isoline across the Gulf of St. Lawrence is problematic, depending on acceptance or rejection of a 37-m feature shown on the Magdalen Islands. This feature was first proposed as the postglacial marine limit by Robert Chalmers (see Goldthwait, 1915) and figured as such by Prest *et al.* (1968). However, that interpretation was questioned by Grant (1989), who placed the zero isoline north of these islands and the deglacial shoreline on the Magdalen Shelf at -75 m. Shaw *et al.* (2002) followed Grant's interpretation but did not explicitly consider the problem. The 37-m feature is, however, accordant with marine-limit elevations in southwestern Newfoundland and in northwestern Prince Edward Island, on either side of the Gulf directly to the east and west. It is considered to be a postglacial marine feature by M. Parent (Geological Survey of Canada, personal communication, 2004) based on elevations of probable raised beach sands. It is, therefore, tentatively accepted here. The zero isoline is placed offshore from southern and southeastern Newfoundland, in contrast to earlier renditions, because postglacial raised shorelines have been reported throughout that region (Brookes, 1977: 9 m at Wreckhouse; Tucker *et al.*, 1982: 6 m at Fortune; Rogerson and Tucker, 1972: 11 m at Spear Island; Catto *et al.*, 2000: 6 m at Horse Cove). It is far offshore from northeastern Newfoundland to Hudson Strait, as required by the high marine limits along the Labrador coast, which however decline to 15 m in the north (Løken, 1962; Ives, 1963). The zero isoline intersects Resolution Island at the mouth of Hudson Strait, but marine limit rises to 21 m on adjacent Edgell Island (Kaplan and Miller, 2003). It is then located offshore

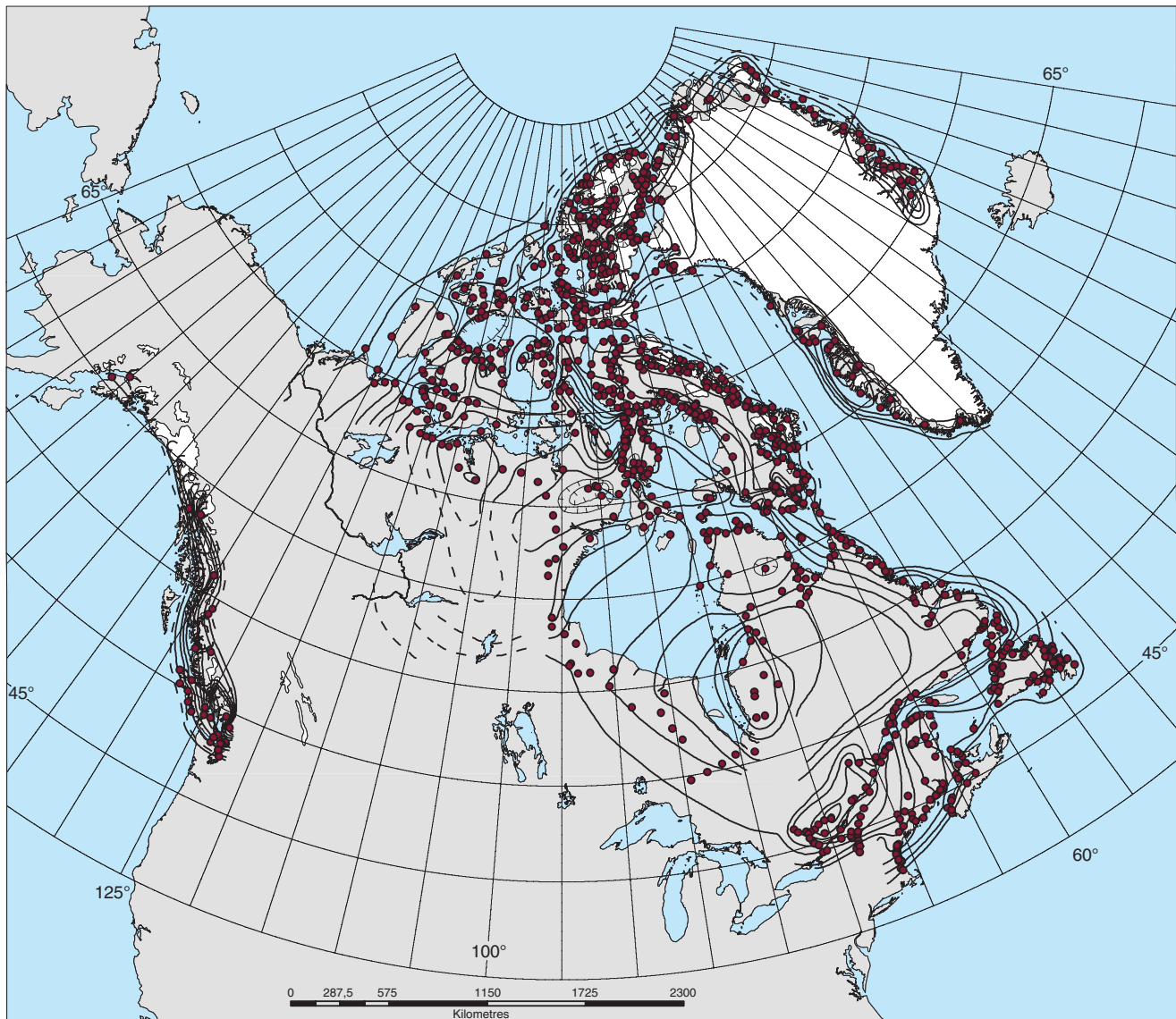


FIGURE 4. Sites of recorded marine-limit elevations listed in the Appendix.

Altitude des limites marines présentées en annexe.

along most or all of eastern Baffin Island but onshore in south-eastern Devon Island, where deglacial meltwater channels can be traced down to the present shoreline (Dyke, 1998). It is apparently located offshore around the entire length of Greenland (Funder, 1989) and off the northwestern Canadian polar margin as far as its landfall at Cape Bathurst, east of the Mackenzie Delta (Prest *et al.*, 1968). The position of the zero isoline near Banks Island remains somewhat problematic, because no radiocarbon dates are available to document post-glacial (as opposed to earlier) marine overlap of the western part of that island. Nevertheless, because the last glacial limit has been placed at the moraines flanking the north and south coast of that island (Dyke and Prest, 1987; Dyke, 2004a), the associated raised shorelines at 20 m (*e.g.* the ice-contact delta at Sachs Harbour; Vincent, 1983) are necessarily of the same age as the moraines and are so plotted here. In the Pacific, the deglacial marine-limit zero isoline passes approximately

through Seattle, Washington (Thorson, 1980), is offshore of Vancouver Island, but evidently lies landward of the Queen Charlotte Islands (Josenhans *et al.*, 1997). It is undefined along the southeast coast of Alaska.

The most salient features of the marine-limit topography (Fig. 5) are similar to those on the map of Andrews (1972). These features are (1) the cell of highest values in south-eastern Hudson Bay, here reaching 270 m (Hillaire-Marcel, 1980; Vincent, 1989), (2) the cell of high values near Bathurst Inlet in the western arctic mainland, reaching 228 m (Kerr, 1996), and (3) the cell of high values over the Eureka Sound region between Ellesmere and Axel Heiberg islands in the Canadian High Arctic, reaching 156 m (Bell, 1996; Bednarski, 1998). The shapes of these cells differ from the earlier rendition, particularly that of the Bathurst Inlet cell, which is shown as more elongate southward, the trend of the isolines being guided by the lake-limit isolines of glacial Lake McConnell.

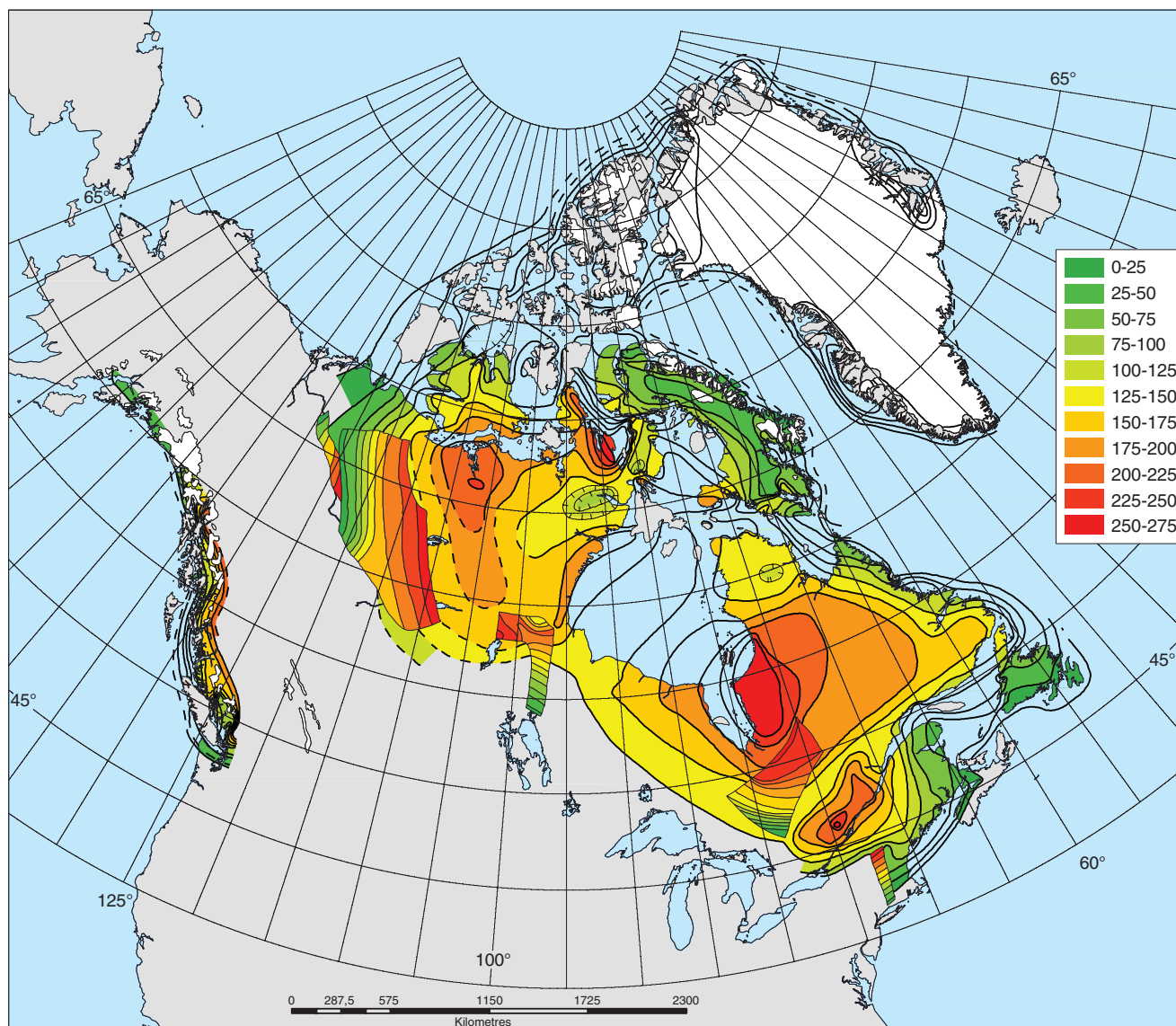


FIGURE 5. Deglacial marine- and lake-limit surfaces, North America and Greenland. Dashed isolines are more tentatively placed than others. The framed insets show lake-limit isolines for glacial Lake Mackenzie (smaller) and Lake McConnell (larger) in the Northwest Territories, a portion of the Ojibway phase of Lake Agassiz in northern Manitoba, a portion of Lake Ojibway in Québec and Ontario, and Lake Hitchcock in New England. The marine-limit isolines are at 25-m intervals starting at 0 m. Lake Mackenzie isolines are at 20-m intervals starting at 80 m elevation, Lake McConnell at 20-m intervals starting at 180 m, Lake Agassiz at 20-m intervals starting at 200 m, Lake Ojibway at 20-m intervals starting at 245 m, and Lake Hitchcock at 25-m intervals starting at 45 m.

Two additional high cells on the marine-limit surface are located over eastern Boothia Peninsula to northeastern Keewatin, reaching 255 m (Dyke, 1984; Giangioppi *et al.*, 2003), and in southern Foxe Basin, reaching 195 m (Bird, 1970; Laymon, 1988). These cells are less clear on the earlier map of Andrews (1972) because of the fewer data then available. Also similar to the map of Andrews (1972), is the region of high marine limits along the Ottawa-St. Lawrence valley,

Surfaces marines et lacustres de déglaciation, pour l'Amérique du Nord et le Groenland. Les isolignes pointillées sont plus incertaines que les autres. Les encadrés montrent les isolignes des limites lacustres du lac glaciaire Mackenzie (petit) et du lac McConnell (grand) dans les Territoires du Nord-Ouest, une partie de la phase Ojibway du lac Agassiz au nord du Manitoba, une partie du lac Ojibway au Québec et en Ontario, et le lac Hitchcock en Nouvelle-Angleterre. Les isolignes des limites marines sont espacées de 25 m et débutent à 0 m. Les isolignes du lac Mackenzie sont espacées de 20 m et débutent à 80 m, celles du lac McConnell sont espacées de 20 m et débutent à 180 m, celles du lac Agassiz sont espacées de 20 m et débutent à 200 m, celles du lac Ojibway sont espacées de 20 m et débutent à 245 m et celles du lac Hitchcock sont espacées de 25 m et débutent à 45 m.

reaching 250 m (Fulton, 1987; Occhietti, 1989). Although Vincent (1989) showed the highest marine limit in the Ottawa region as 275 m in the Gatineau valley, Occhietti (1989) considered that area to have been inundated by fresh water, and the 275-m site of Vincent is, therefore, not included here. Andrews (1972) showed the high values of the Ottawa region as an extension of the southeast Hudson Bay cell. However, on Figure 5 these are shown as a closed cell of high values

with a negative (downward) northwestward slope, because the trend of lake-limit isolines across Lake Ojibway (Veillette, 1994) does not allow connection of high marine-limit contours between the two regions.

Prominent regions of low marine-limit elevations located well inboard of the limit of glaciation occur in north-central Keewatin, where elevations fall below 100 m (Lee, 1968; Prest *et al.*, 1968; Dredge and McMartin, 2005), on the Ungava Peninsula of Québec, where elevations fall below 125 m (Lauriol, 1982) and over the spine of Baffin Island, where elevations fall below 50 m. The last are the lowest values to be found inboard of higher values in the glaciated region (Blake, 1966; Andrews, 1970b; Dyke, 1979b). Also of note are the negative slope of 100 m northward across Foxe Basin and the 100 m positive (upward) slope northeastward across northern Ontario.

The edge of a final cell of high values in Canada, the centre of which must well exceed 230 m (Miller, 1973; Clague, 1989), is located along the Pacific coast. These high values might reasonably be extrapolated across the central Cordilleran Ice Sheet region. Although we currently lack lake-limit data to guide the trend of the isolines there, lines of 100 m and greater value must close to make a separate cell over the Cordilleran region if the 100-m line over the Laurentide Ice Sheet region is correctly tied into the lake-limit isolines of Lake McConnell from the north.

Three cells with marine-limit elevations exceeding 100 m are shown in Greenland (Funder, 1989). One of these, reaching 140 m in the northwest (England, 1985), is an extension of the cell over the Canadian High Arctic. The other two, reaching maximum values of 140 m (Kelly, 1973) and 115 m (Funder, 1990), coincide with the widest strips of ice-free land in southwestern and central-eastern Greenland, respectively. Lower ridges of marine-limit values, exceeding 50 m, extend along the coast from these cells.

LAKE LIMITS

Lake-limit surfaces generally rise, as expected, toward the centre of the glaciated region. The Lake McConnell and Lake Ojibway (in Québec and easternmost Ontario) surfaces are particularly useful in guiding the trends of marine-limit isolines through interior regions. Unfortunately, similar data are not available for the vertical limits of Lake Ojibway in most of its extent in Ontario.

In the case of Lake Hitchcock and Lake Ojibway, the lake-limit surfaces have gradients that are clearly greater than those of the adjacent marine-limit surfaces, which is to be expected as discussed above. Both these lakes show only positive northward gradients, with that of Lake Hitchcock being essentially constant and that of Ojibway convex upward. Lakes Mackenzie and McConnell have entirely positive lake-limit gradients. However, the McConnell gradient decreases toward the centre of the ice sheet. The McConnell gradient exceeds the gradient of the adjacent marine-limit surface to the north, as expected. The lake-limit surface of the Ojibway phase of Lake Agassiz is evidently more complex with a positive northward gradient followed by an irregular negative gradient at its north end.

DISCUSSION

MARINE LIMITS

In Canada, most of the cells of high marine limits correspond approximately to areas of inferred maximum former ice thickness. The cells over southeastern Hudson Bay and Québec, over Bathurst Inlet and areas to the south, and over southern Foxe Basin roughly reflect the areas of maximum ice thickness of the Labrador Sector, the Keewatin Sector, and the Baffin Sector of the Laurentide Ice Sheet, respectively (Dyke and Prest, 1987; Dyke *et al.*, 2002; Dyke, 2004a). The cell over the High Arctic corresponds to the area of maximum thickness of the Innuitian Ice Sheet (Blake, 1970; Dyke, 1998; Atkinson and England, 2004). Finally the cell over the Cordillera is related to uplift engendered by removal of the Cordilleran Ice Sheet, which had its thickest ice in the region between the coastal mountain ranges and the Rocky Mountains (Clague, 1989). If the marine-limit surface along the Pacific coast were extrapolated a short distance inland, the indicated postglacial increase in elevation over central British Columbia would exceed that of southeast Hudson Bay, which is generally taken to be the highest in the world.

In contrast to the interpretation above, the high marine-limit elevations over the St. Lawrence-Ottawa region and over the Gulf of Boothia region are interpreted as resulting from incursion of the sea into areas that were still greatly depressed at time of deglaciation rather than former ice-load centres (Occhietti, 1989; Dyke and Dredge, 1989). This interpretation is compatible with the most recent interpretation of pattern of deglaciation (Dyke, 2004a).

A trough of low marine limits (<150 m) over western Hudson Bay may indicate a separation of Keewatin and Labrador sector uplifts that was not previously recognized. This feature is defined by a series of marine-limit determinations in northern Manitoba that decline to a low of 125 m (Klassen, 1986; Dredge and Nixon, 1992) and by a single determination of 124 m on Coats Island (Aylsworth and Shiels, 1991). In the former area, the apparent marine limit is just above a prominent marine feature known as the Great Beach. All water-laid sediment above it apparently was deposited in glacial Lake Agassiz. The Great Beach is traceable for over 180 km and rises from 125 m at its south end to about 145 m at its north end. In addition to its large form, it is conspicuous because the Lake Agassiz basin inland of it lacks beaches (Klassen, 1986; Dredge and Nixon, 1992) due to the sudden final drainage of the lake (Clarke *et al.*, 2004). The apparent marine limit on Coats Island is a clear upper limit of raised beaches, above which is evidently unmodified till. Thus, the trough of low marine-limit values appears to be a valid feature. It is not readily interpretable as a product of late deglaciation.

In Greenland, the highest marine limits correspond to areas of greatest ice-load reduction, rather than to areas of greatest former ice thickness, because most of that ice load is still present. Thus, the highest raised shorelines are in areas where the coastal ice-free zone is widest and values decline from the outer or central coasts toward the present ice margin.

Other elements of the marine-limit topography can best be interpreted in terms of the pattern of deglaciation. Among these

are the following clear examples: (1) The low values over northern Keewatin and the spine of Baffin Island, discussed above, correspond to areas of late deglaciation, as does the long negative northward slope of values across Foxe Basin. (2) The steep negative eastward slope on the marine-limit surface on western Melville Peninsula, one of the most prominent features of the map and where values decrease eastward from 225 m to 125 m, corresponds with a large regional end moraine, the Melville Moraine, from which the ice retreated slowly enough for 100 m of emergence to occur (Dredge, 1990). (3) A westward drop in marine-limit elevation of similar magnitude at the head of Frobisher Bay on southeastern Baffin Island corresponds to a major belt of end moraines there (Blake, 1966; Miller, 1980), and the southwestward decline of values from a ridge over the northeast Baffin Island fiords similarly corresponds with a dense belt of end moraines (Andrews *et al.*, 1970; Hodgson and Haselton, 1974). (4) The abrupt drop of marine limit on southern Melville and northwestern Victoria islands from 90-120 m on the distal side of Winter Harbour Till to 30-55 m on the proximal side records emergence that occurred between the onset of ice recession prior to the Winter Harbour Advance of the Laurentide Ice Sheet and the onset of recession after the advance (Hodgson and Vincent, 1984). (5) The decrease of values from the outer coasts to the spine of Devon Island by 25-50 m reflects inland recession of the ice cap on that island (Dyke, 1998). (6) The negative marine-limit slope of about 100 m northwest of the St. Lawrence lowlands indicates slow ice recession across that region. (7) The decline of marine-limit elevations by as much as 50-60 m inland from the southeast coast of Hudson Bay reflects emergence that occurred while ice stood at and retreated behind the Sakami Moraine (Allard and Seguin, 1985). (8) Smaller negative gradients related to slow ice recession occur along central, northern, and east-central Ellesmere Island fiords (Hodgson, 1985; Smith, 1999; England *et al.*, 2000, 2004) and along fiords in western Newfoundland (Grant, 1987) and British Columbia (Friele and Clague, 2002). More detailed mapping of marine limits will probably bring to light other areas where strong negative marine-limit gradients can be related to the history of ice recession.

LAKE LIMITS

A problematic feature of the lake-limit data is the difference between the lake-limit elevation of northernmost Lake Hitchcock in the Connecticut River valley and the marine limit in the adjacent Lake Champlain valley. The northernmost Lake Hitchcock limit, at 245 m, is uplifted by 200 m more than its southern outlet, at 45 m (Koteff *et al.*, 1993). The 0-m marine-limit isoline near Boston (which is also the 0-m isobase on the 14 500 ¹⁴C BP marine shoreline) is here extrapolated westward to correspond to the 70-m level of Lake Hitchcock, leaving northernmost Lake Hitchcock 175 m higher than that. The marine limit in that part of the Lake Champlain valley that lies along the same isobase as northernmost Lake Hitchcock and 100 km to the west-southwest is at 67 m (West Bridport site of Stewart and MacClintock, 1969; correlated using the isobase trend of Parent and Occhietti, 1988). If both elevations and the inferred history of Lake Hitchcock are correct, the difference of about 108 m can only be accommodated by the rise

of eustatic sea level between the time that the Lake Hitchcock outlet in Connecticut was deglaciated (15 400 ¹⁴C BP based on the age of the basal varve in southernmost Lake Hitchcock [Ridge, 2004]; note that the age of this varve has been revised from 14 820 ¹⁴C BP of Ridge *et al.* [1999]) and the time of formation of the marine limit in the Lake Champlain valley. Dyke (2004a) placed the latter at about 11 500 ¹⁴C BP, although it may date as late as 11 100 ¹⁴C BP (Richard and Occhietti, 2005; recall that marine limit is synchronous in this region). Relative sea level at Barbados, the most commonly cited modern eustatic sea-level reference, was at about -68 m and -72 m at 11 100 and 11 500 ¹⁴C BP, respectively (Fairbanks, 1989). Because eustatic sea level at 15 400 ¹⁴C BP was at -113 m, only 45 m of eustatic sea-level rise occurred between that time and 11 100 ¹⁴C BP. The problem cannot be resolved even by allowing deglaciation of the lake outlet to be much earlier than thought because eustatic sea-level rise between 18 000 and 11 100 ¹⁴C BP was only 60 m. Thus, an error in either the interpretation of the lake history or marine limits is indicated. An attempt to reconcile these data might start with evaluating the assumption that Lake Hitchcock was still using its southernmost outlet when its northernmost lake-limit shorelines were forming.

A further issue involves the negative slope on the lake limit of northernmost Lake Agassiz, here shown as less steep than would be indicated by several of the lower sets of shorelines assigned to Lake Agassiz by Dredge (1983a) and Dredge *et al.* (1986). The pattern of deglaciation in this region, a simple northward recession of the ice margin toward the 60th parallel, is not controversial, because it seems clear from the landform record (Dredge *et al.*, 1986). The fragment of the Lake Agassiz record that is preserved in northernmost Manitoba is probably related to the Ojibway phase of Lake Agassiz when outflow was via the Ottawa River headwater in Québec and when the southern shore of Lake Agassiz in Manitoba either barely enclosed Lake Winnipeg or later ended north of Lake Winnipeg (Klassen, 1983, 1986; Thorleifson, 1996; Dyke, 2004a). The Ottawa River was the last available outlet of Lake Agassiz prior to catastrophic northward drainage to Hudson Bay (Clarke *et al.*, 2004). In that reconstruction, northward declining lake limits and shorelines below the lake limit within northern Lake Agassiz can only relate to differential uplift unless numerous subglacial drainage events occurred. Ignoring lake stages lower than 340 m and assuming an Ottawa River outlet throughout, data indicate a negative northward lake-limit slope of about 100 m across about 1.5° of latitude at the north end of the basin. Thus, during the time the ice margin retreated across that part of the basin, 100 m more uplift occurred there than occurred at the Ottawa River outlet. Lake Agassiz was emptied by northward drainage at about 7700 ¹⁴C BP, since which time 180 m of emergence (about 200 m of uplift) has occurred on the adjacent coast of Hudson Bay. Current reconstruction of ice retreat (Dyke, 2004a) places the beginning of ice recession from the highest Agassiz shorelines north of Reindeer Lake (442 m) at 8000-8200 ¹⁴C BP. Thus in a span of 300-500 years, that region was uplifted 100 m more than was the Ottawa River outlet. Because the implied uplift rate is much larger than others currently known for areas of Laurentide glaciation, the pattern of lake limits

shown may be a misleading target for uplift modelling. Alternative interpretations of the lake shoreline data might involve (a) considering whether multiple subglacial drainages or partial drainages of Lake Agassiz occurred (as implicit in Dredge, 1983a), or (b) considering whether these shorelines were formed in lakes independent of Lake Agassiz, such as a lake in the Reindeer Lake basin.

CONCLUSION

Marine-limit and certain lake-limit surfaces can now be reconstructed reasonably well for much of Canada and Greenland and in greater detail for the northern, central and eastern Arctic, as well as for southeastern Canada and New England. In these details can be recognized the influences of maximum ice-load distributions and the pattern and relative rates of deglaciation as currently understood. These virtual topographies form an independent set of data that already have been largely reconciled with the pattern of deglaciation, because marine-limit ages known from radiocarbon dating are a large part of the age control used for deglaciation maps (Dyke, 2004a). Hence, they are valuable targets for replication by geophysical models of glacioisostatic adjustment, which traditionally have chosen other and perhaps more straightforward targets, such as relative sea-level curves. Nevertheless, certain aspects of the primary data, lake-limit data in particular, are problematic and alternative interpretations might be considered. Modelling may bring to light other currently accepted interpretations that are problematic.

Future syntheses of marine- and lake-limit surfaces should aim at capturing full local details of variability. Researchers would greatly contribute to these syntheses by reporting geographic co-ordinates of their measured sites.

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APPENDIX

Locality	Latitude	Longitude	Marine Limit	Reference
Rivière Boniface	57.600000	-76.250000	175	Allard and Rousseau (1999)
Lac Werden	56.600000	-75.750000	206	Allard and Seguin (1985)
Rivière Nataspoka	56.891667	-76.425000	240	Allard and Seguin (1985)
Rivière Ouatichouane	56.050000	-75.350000	217	Allard and Seguin (1985)
Elson Point	58.875000	-65.983333	100	Allard <i>et al.</i> (1989)
Lac Qarliq	58.900000	-65.500000	87	Allard <i>et al.</i> (1989)
Weymouth Fiord	59.400000	-65.250000	62	Allard <i>et al.</i> (1989)
Goose Valley	73.166667	-79.883333	35	Allard (1997)
Gould Pond (Dexter)	44.983333	-69.316667	115	Anderson <i>et al.</i> (1992)
Kangok Fiord North	68.633333	-68.400000	55	Andrews and Drapier (1967)
Loozie Bay	68.783333	-68.616667	61	Andrews and Drapier (1967)
Kangok Fiord head	68.600000	-68.916667	34	Andrews and Drapier (1967), Andrews <i>et al.</i> (1970)
Tingin Fiord head	68.950000	-69.116667	86	Andrews and Drapier (1967), Andrews <i>et al.</i> (1970)
Piling Lake	68.933333	-74.133333	82	Andrews and Drapier (1967), Dredge (2003c)
Gilmour Island	59.833333	-80.000000	155	Andrews and Falconer (1969)
Bella Bella	52.150000	-128.100000	120	Andrews and Retherford (1978)
Bella Coola	52.380000	-126.750000	165	Andrews and Retherford (1978)
Cape Hooper	68.433333	-66.766667	40	Andrews <i>et al.</i> (1970)
Kangok Fiord mouth	68.633333	-68.400000	79	Andrews <i>et al.</i> (1970)
Pitchforth Fiord	69.016667	-67.883333	55	Andrews <i>et al.</i> (1970)
Pitchforth Fiord head	68.958333	-68.566667	69	Andrews <i>et al.</i> (1970)
Tasiujaq	68.866667	-69.450000	43	Andrews <i>et al.</i> (1970)
Tikkigatsiak Island	57.200000	-61.750000	78	Andrews (1963)
Umiakorvik Lale	57.500000	-62.800000	94	Andrews (1963)
Fellside Lake	70.016000	-77.670000	91	Andrews (1966)
Isortoq River	70.030000	-76.830000	69	Andrews (1966)
Astarte River	69.116667	-75.033333	83	Andrews (1970b)
Flint Lake head	69.366667	-74.000000	40	Andrews (1970b)
North Tweedsmuir Island	68.616667	-74.700000	106	Andrews (1970b)
Kingnait Harbour	66.050000	-65.266667	72	Andrews (1975)
Cape Nathorst	77.933333	-99.900000	60	Atkinson and England (2004)
Gunnars Island South	77.291667	-85.383333	85	Atkinson (1999)
Svante Fiord mouth	77.608333	-84.983333	107	Atkinson (1999)
Svendsen Peninsula	77.543333	-84.500000	87	Atkinson (1999)
Hoved Island	77.533333	-85.216667	102	Atkinson (1999), England <i>et al.</i> (2004)
Cape Sverre	78.766667	-97.666667	106	Atkinson (2003)
Panarctic Amund Central Dome	78.325000	-96.250000	100	Atkinson (2003)
Kanairiktok River	54.816667	-60.733333	100	Awadallah and Batterson (1990)
Moran Lake	54.550000	-60.783333	125	Awadallah and Batterson (1990)
Coats Island	62.900000	-82.000000	124	Aylsworth and Shilts (1991)
Kinga Lake	61.933333	-96.465278	170	Aylsworth <i>et al.</i> (1986)
Clyde Inlet head	69.850000	-70.466667	61	Barnett in Andrews and Drapier (1967)
Inugsuin Fiord head	69.633333	-70.033333	68	Barnett in Andrews and Drapier (1967)
Chalk River	46.020000	-77.450000	175	Barnett (1988)
Goose Arm	49.123056	-57.932500	60	Batterson and Catto (2001)
Reidville (Junction Br)	49.250000	-57.383333	45	Batterson and Catto (2001)
Dildo South	47.500000	-53.570000	14	Batterson and Taylor (2003)
Hearts Content	47.870000	-53.380000	9	Batterson and Taylor (2003)
Hearts Delight	47.770000	-53.470000	12	Batterson and Taylor (2003)
Southern Harbour	47.750000	-54.000000	13	Batterson and Taylor (2003)
Clements Markham Inlet, middle	82.800000	-66.916667	110	Bednarski (1986)
Clements Markham Inlet, mouth	82.900000	-66.416667	95	Bednarski (1986)
Gypsum River	82.700000	-68.116667	124	Bednarski (1986)
Hare Fiord	81.083333	-85.233333	110	Bednarski (1995)
Hvitland Peninsula	81.100000	-87.200000	116	Bednarski (1995)
Jugeborg Fiord	81.316667	-89.700000	135	Bednarski (1995)
Allison Point	75.100702	-99.134490	114	Bednarski (1996)
Dundee Bight	75.967403	-99.301257	116	Bednarski (1996)
Dyke Acland Bay	75.004993	-98.995741	114	Bednarski (1996)
Freemans Cove	75.129384	-98.103609	107	Bednarski (1996)
Hooker Bay	75.349836	-99.851901	105	Bednarski (1996)

Locality	Latitude	Longitude	Marine Limit	Reference
Ile Vanier	76.258000	-102.313000	106	Bednarski (1996)
Massey Island	76.084087	-102.550972	110	Bednarski (1996)
Schomberg Point	75.550728	-102.750928	111	Bednarski (1996)
Truro Island	75.316667	-97.166667	107	Bednarski (1996)
Walker River	75.950741	-97.867791	111	Bednarski (1996)
Flat Sound	80.266667	-89.250000	143	Bednarski (1998)
Lightfoot River	80.716667	-91.000000	110	Bednarski (1998)
Rens Lake	81.083333	-92.250000	84	Bednarski (1998)
Schei Peninsula West	80.366667	-88.550000	156	Bednarski (1998)
Stang Bay	80.416667	-89.483333	143	Bednarski (1998)
Nachvak Fiord inner	59.050000	-63.950000	55	Bell <i>et al.</i> (1989)
Nachvak Fiord mouth	59.060000	-63.330000	68	Bell <i>et al.</i> (1989)
Cape St George	48.466666	-59.250000	65	Bell <i>et al.</i> (2003)
Stephenville	48.416667	-58.466667	27	Bell <i>et al.</i> (2003)
Black Top Ridge	80.250000	-85.033333	149	Bell (1996)
Blue Man Cape	79.800000	-86.300000	150	Bell (1996)
Hare Cape	79.733333	-85.783333	149	Bell (1996)
Hot Weather Creek	79.966667	-84.433333	145	Bell (1996)
Remus Creek North	79.963611	-85.361667	146	Bell (1996)
Romulus Lake	79.850000	-85.283333	145	Bell (1996)
Troelsen Ridge	80.066667	-86.566667	152	Bell (1996)
Danmark Fiord head	80.516667	-23.500000	35	Bennike and Weidick (2001)
Holm Land Northeast	80.500000	-16.000000	80	Bennike and Weidick (2001)
Ile de France	77.846667	-17.766667	60	Bennike and Weidick (2001)
Island off Sanddalen	78.126667	-20.300000	40	Bennike and Weidick (2001)
Kilen	81.166667	-14.000000	80	Bennike and Weidick (2001)
Lambertland	79.231667	-19.095000	65	Bennike and Weidick (2001)
Nioghalvfjærdsfjorden inner	79.586667	-21.681667	40	Bennike and Weidick (2001)
Nioghalvfjærdsfjorden mouth	79.748333	-18.860000	65	Bennike and Weidick (2001)
Disko Fiord	69.483333	-53.466667	83	Bennike <i>et al.</i> (1994)
Disko Fiord mouth	69.433333	-54.350000	69	Bennike <i>et al.</i> (1994)
Disko Island Northwest	70.266667	-54.616667	60	Bennike <i>et al.</i> (1994)
Bronlundhus	82.183333	-30.533333	65	Bennike (1987)
Kolelv West	82.150000	-29.633333	80	Bennike (1987)
Cass Fiord	80.116667	-65.200000	65	Bennike (2002)
Humboldt Glacier	79.941667	-64.285000	65	Bennike (2002)
Kap Morten	81.176667	-63.341667	110	Bennike (2002)
Lafayette Bay	80.311667	-67.393333	90	Bennike (2002)
Rivière-à-la-Chaloupe	50.287500	-65.121111	91	Bigras and Dubois (1987)
Dover	43.224000	-70.960000	67	Birch (1980)
South Bay	64.100000	-84.083333	160	Bird (1970)
Southampton Island	64.700000	-84.766667	133	Bird (1970)
Southampton Island	64.283333	-82.950000	152	Bird (1970)
Southampton Island	65.100000	-83.400000	190	Bird (1970)
Southampton Island East	63.750000	-80.400000	157	Bird (1970)
Southampton Island Northeast	64.500000	-81.750000	180	Bird (1970)
The Points	63.550000	-85.000000	172	Bird (1970)
White Island	65.850000	-85.000000	158	Bird (1970)
Inglefield Land	78.633333	-72.283333	87	Blake <i>et al.</i> (1992)
Refuge Harbour	78.453333	-72.616667	96	Blake <i>et al.</i> (1992)
Clarence Head	76.793333	-77.800000	80	Blake in Lowdon and Blake (1981)
Cape Rammelsberg	63.391667	-68.416667	120	Blake (1966), Mode and Jacobs in Andrews and Short (1983)
Bowman Bay	65.400000	-73.200000	107	Blake (1966), Prest <i>et al.</i> (1968)
Anstead Point	76.491667	-81.616667	105	Blake (1975)
Baad Fiord	76.683333	-86.316667	110	Blake (1975)
Cape Storm	76.391667	-87.633333	130	Blake (1975)
South Cape Fiord	76.525000	-85.200000	115	Blake (1975)
Baird Inlet	78.533333	-76.066667	90	Blake (1988)
Berwick	43.250000	-70.865000	61	Bloom (1963), Thompson <i>et al.</i> (1989)
Clyde Cliffs	70.658333	-69.066667	23	Briner <i>et al.</i> (2005)
Abrahams Cove	48.520833	-58.906111	43	Brookes (1969)
Robinsons Head	48.262500	-58.796944	44	Brookes (1974)
Rope Cove	48.916667	-58.485000	75	Brookes (1974)
Wreckhouse	47.700000	-59.300000	9	Brookes (1977)

Locality	Latitude	Longitude	Marine Limit	Reference
Blackhead Bay	48.580000	-53.270000	25	Brookes (1989)
Clareville	48.190000	-53.970000	17	Brookes (1989)
Plate Cove	48.510000	-53.500000	27	Brookes (1989)
Trinity	48.370000	-53.370000	17	Brookes (1989)
Horse Cove	47.566667	-52.900000	6	Bruckner (1969), Rogerson and Tucker (1972), Catto (2000)
Foul Bay	62.150000	-73.050000	155	Bruneau and Gray (1997)
Morrisonville	44.683300	-73.550000	130	Chapman (1937)
Mullen Brook	44.116700	-73.483300	74	Chapman (1937)
St Albans	44.800000	-73.080000	134	Chapman (1937)
West Chazy	44.816700	-73.600000	142	Chapman (1937)
Brooks Peninsula	50.104167	-127.750830	20	Clague <i>et al.</i> (1982)
Cape Scott	50.740000	-128.330000	27	Clague <i>et al.</i> (1982)
Hesquiat Harbour	49.475000	-126.441660	34	Clague <i>et al.</i> (1982)
Hirsch River	54.063333	-128.593330	200	Clague <i>et al.</i> (1982)
Lakelse Lake	54.416667	-128.516660	200	Clague <i>et al.</i> (1982)
Tofino	49.100000	-125.850000	50	Clague (1981)
Aulatsivik Island South	56.666667	-61.394444	71	Clark and Fitzhugh (1992)
Makkovik Harbour head	55.083333	-59.166667	107	Clark and Fitzhugh (1992)
Okak	57.500000	-62.000000	79	Clark and Fitzhugh (1992)
Saglek Fiord	58.500000	-62.966667	55	Clark (1988)
Shoal Cove	59.358333	-63.791667	56	Clark (1988)
Point Mackenzie	61.246944	-150.028611	36	Combellick and Reger (1994)
Armark River	66.750000	-100.500000	168	Craig (1961)
Chantrey Inlet	67.000000	-94.800000	152	Craig (1961)
Kaleet River	66.300000	-98.200000	168	Craig (1961)
MacAlpine Lake	66.816667	-103.100000	198	Craig (1961), Kerr (1996)
Fawn River	54.000000	-88.600000	152	Craig (1969), Dredge and Cowan (1989)
Kapiskau	51.933333	-84.533333	158	Craig (1969), Skinner (1973), Dredge and Cowan (1989)
Adams Sound	72.900000	-85.000000	74	Craig (unpublished map)
Hopedale	55.916667	-60.750000	119	Daly (1902), Clark and Fitzhugh (1990)
Big Lake	48.384167	-122.233330	90	Dethier <i>et al.</i> (1995)
Mt Vernon North	48.442667	-122.322167	90	Dethier <i>et al.</i> (1995)
Pear Point	48.523667	-123.006833	100	Dethier <i>et al.</i> (1995)
Port Angeles	48.128500	-123.400000	50	Dethier <i>et al.</i> (1995)
San Juan Island	48.625000	-123.133330	80	Dethier <i>et al.</i> (1995)
Whidbey Island	48.283333	-122.550000	60	Dethier <i>et al.</i> (1995)
Penn Cove	48.241667	-122.666660	60	Dethier <i>et al.</i> (1995), Kovanen and Slaymaker (2004)
Bic	48.376389	-68.706944	100	Dionne and Coll (1995)
Point Hubert	48.075556	-69.750000	130	Dionne and Occhietti (1996)
Tadoussac North	48.180556	-69.700556	136	Dionne and Occhietti (1996)
Matane	48.844444	-67.559722	110	Dionne (1977)
Rivière-du-Loup	47.820000	-69.513333	155	Dionne (1977)
Akugdlit	68.650000	-51.250000	110	Donner and Jungner (1975)
Kanala	68.600000	-52.566667	116	Donner and Jungner (1975)
Missisa Lake	52.600000	-85.300000	167	Dredge and Cowan (1989)
Nagagami River	49.750000	-84.400000	137	Dredge and Cowan (1989)
Partridge River	50.600000	-80.400000	182	Dredge and Cowan (1989)
Severn River	55.200000	-90.500000	152	Dredge and Cowan (1989)
Sutton Ridge	54.500000	-85.500000	180	Dredge and Cowan (1989)
Bennett Bay	66.064410	-90.470300	50	Dredge and McMartin (2005)
Bennett Bay	65.986120	-90.194850	95	Dredge and McMartin (2005)
Brown Lake West	65.940600	-91.486670	96	Dredge and McMartin (2005)
Sila Lodge	65.581800	-97.018900	95	Dredge and McMartin (2005)
Caribou River	59.000000	-96.000000	180	Dredge and Nixon (1992)
Churchill River	58.100000	-94.700000	145	Dredge and Nixon (1992)
Gods River	56.000000	-92.250000	137	Dredge and Nixon (1992)
Kaskattama Uplands	56.100000	-90.000000	146	Dredge and Nixon (1992)
Owl River	57.600000	-93.533333	140	Dredge and Nixon (1992)
Stupart River	55.983333	-93.383333	137	Dredge and Nixon (1992)
South Knife River	58.500000	-96.000000	160	Dredge and Nixon (1992), Dredge <i>et al.</i> (1986)
Kugaryuak River	67.660000	-113.635000	170	Dredge <i>et al.</i> (1998)
Tree River	67.504167	-112.033330	210	Dredge <i>et al.</i> (1998)
Baie Trinité	49.417000	-67.300000	103	Dredge (1983b)
Godbout	49.500000	-67.600000	100	Dredge (1983b)

Locality	Latitude	Longitude	Marine Limit	Reference
Moisie River	50.300000	-66.200000	128	Dredge (1983b)
Port Cartier	50.033000	-66.867000	123	Dredge (1983b)
Rivière Pentecote	49.783000	-67.167000	120	Dredge (1983b)
Rivière Sainte-Marguerite	50.133000	-66.600000	125	Dredge (1983b)
Ajaqutalik River	68.250000	-83.000000	110	Dredge (1995)
Amherst East	69.666667	-82.750000	120	Dredge (1995)
Amherst South	69.683333	-84.050000	140	Dredge (1995)
Amitoke Peninsula	68.133333	-82.500000	130	Dredge (1995)
Amitoke Peninsula	68.166667	-82.416667	140	Dredge (1995)
Bagnall	68.333333	-85.500000	145	Dredge (1995)
Blacks Inlet	68.950000	-84.916667	170	Dredge (1995)
Cape Ellice	69.633333	-85.333333	200	Dredge (1995)
Corcoran	68.500000	-85.750000	220	Dredge (1995)
Corrigal	69.416667	-85.083333	140	Dredge (1995)
Ellice South	69.583333	-85.333333	220	Dredge (1995)
Foster Lake South	68.000000	85.750000	150	Dredge (1995)
Franklin North	69.516667	-85.416667	220	Dredge (1995)
Fury & Hecla Strait	69.800000	-84.500000	160	Dredge (1995)
Garry Bay Central	68.716667	-84.916667	160	Dredge (1995)
Garry Bay East	68.716667	-84.583333	130	Dredge (1995)
Garry Bay West	68.716667	-85.333333	200	Dredge (1995)
Hall Lake	68.583333	-82.750000	140	Dredge (1995)
Hall Lake North	68.716667	-83.066667	120	Dredge (1995)
Hopkins	69.250000	-85.416667	180	Dredge (1995)
Kingora River	68.583333	-83.000000	110	Dredge (1995)
Lailor Lake	69.166667	-82.583333	95	Dredge (1995)
Lailor Lake Southwest	69.100000	-83.133333	110	Dredge (1995)
Selkirk	68.166667	-85.750000	170	Dredge (1995)
Sibbald	68.300000	-85.750000	235	Dredge (1995)
Blake	66.550000	-83.000000	140	Dredge (2002)
Cape Jermain	67.766667	-81.916667	146	Dredge (2002)
Cape Penrhyn	67.466667	-81.250000	150	Dredge (2002)
Gore Bay	66.216667	-83.916667	180	Dredge (2002)
Haviland-2	66.450000	-85.416667	182	Dredge (2002)
Hoppner Inlet	66.916667	-83.750000	140	Dredge (2002)
Hurd North	66.650000	-85.083333	150	Dredge (2002)
Le froy East	67.300000	-86.333333	120	Dredge (2002)
Le froy West	67.300000	-86.666667	140	Dredge (2002)
Lyon North	66.816667	-84.333333	130	Dredge (2002)
Lyon North-2	67.000000	-84.333333	120	Dredge (2002)
Lyon West	66.633333	-84.166667	155	Dredge (2002)
Matheson River	67.633333	-86.330000	150	Dredge (2002)
North Pole	66.866667	-86.666667	140	Dredge (2002)
Quartzite Lake	67.083333	-81.533333	150	Dredge (2002)
Repulse Bay	66.500000	-86.083333	150	Dredge (2002)
Tasers	67.083333	-85.000000	100	Dredge (2002)
Wales Island East	67.966667	-85.833333	150	Dredge (2002)
Winter Island	66.350000	-83.333333	160	Dredge (2002)
Nadluardjuk River	68.366667	-73.000000	90	Dredge (2003a)
Tweedsmuir Island South	68.450000	-74.266667	110	Dredge (2003a)
Wordie Bay	68.183333	-72.450000	74	Dredge (2003a)
Nadluardjuk Eeat	68.633333	-72.766666	62	Dredge (2003b)
Nadluardjuk West	68.583333	-73.183333	72	Dredge (2003b)
Straits Bay West	68.583333	-74.000000	92	Dredge (2003b)
Longstaff Bluff	68.966667	-75.216667	93	Dredge (2003c)
Piling Bay South	68.833333	-74.733333	96	Dredge (2003c)
Butterfly Lake	69.416667	-75.850000	104	Dredge (2003d)
Flint Lake Central	69.283333	-74.216667	60	Dredge (2003d)
Ikpik East	69.266667	-75.633333	95	Dredge (2003d)
Ipiutik Lake	69.083333	-75.466667	111	Dredge (2003d)
Piling Lake East	69.283333	-74.400000	77	Dredge (2003d)
Rivière Mécatina	50.900000	-59.750000	130	Dubois <i>et al.</i> (1984)
Rivière Natashquan	50.500000	-61.830000	122	Dubois <i>et al.</i> (1984)
St Augustin	51.330000	-58.830000	150	Dubois <i>et al.</i> (1984)

Locality	Latitude	Longitude	Marine Limit	Reference
Baie Comeau	49.216667	-68.194444	136	Dubois (1977)
Sheldrake River	50.333333	-64.600000	130	Dubois (1977)
Gabriel Island	62.900000	-66.533333	97	Duval in Manley and Jennings (1996)
Chase Island	63.033333	-66.883333	114	Duval (1993)
Cape Southwest	78.230278	-91.505000	123	Dyke and England (unpublished)
Cape Southwest	78.274722	-91.911666	130	Dyke and England (unpublished)
Good Friday Bay head	78.560555	-91.878333	92	Dyke and England (unpublished)
Good Friday Bay Southwest	78.485000	-92.735000	114	Dyke and England (unpublished)
Good Friday Bay Southwest	78.633333	-92.933333	123	Dyke and England (unpublished)
Sand Bay	78.800000	-93.283333	123	Dyke and England (unpublished)
Scaare Fiord head	79.000000	-87.900000	123	Dyke and England (unpublished)
Wolf Fiord	78.348889	-88.743333	106	Dyke and England (unpublished)
Jungersen Bay	71.510000	-84.325000	72	Dyke and Hooper (2000)
Sunday Bay	71.676667	-85.150000	88	Dyke and Hooper (2000)
Tikiraq River	71.850000	-86.300000	95	Dyke and Hooper (2000)
Cape Back	70.101667	-116.983880	121	Dyke and Savelle (2000)
Cape Baring	70.033333	-117.283330	115	Dyke and Savelle (2000)
Cape Baring	69.912500	-117.167500	120	Dyke and Savelle (2000)
Kugaluk River	69.672222	-116.550830	120	Dyke and Savelle (2000)
Point Caen	69.341667	-115.467220	93	Dyke and Savelle (2002)
Prince Albert Sound	70.266667	-115.200000	132	Dyke and Savelle (2003a)
Linaluk Island Southwest	70.230766	-113.657600	128	Dyke and Savelle (2003b)
Kuuk River	70.652850	-112.601083	107	Dyke and Savelle (2003c)
Page Point, 30 km West	70.713333	-114.396660	98	Dyke and Savelle (2004a)
Holman Northwest	70.806667	-117.930000	90	Dyke and Savelle (2004b)
Berkeley Point	71.907283	-118.975983	54	Dyke and Savelle (unpublished)
Cape Ptarmigan	70.973833	-118.361783	75	Dyke and Savelle (unpublished)
Arabella Bay	73.650000	-99.500000	133	Dyke <i>et al.</i> (1991)
Baring Channel	73.750000	-98.283333	120	Dyke <i>et al.</i> (1991)
Browne Bay	73.175000	-98.550000	95	Dyke <i>et al.</i> (1991)
Cape Anne	74.030000	-94.800000	122	Dyke <i>et al.</i> (1991)
Cape Hardy	73.791667	-97.700000	95	Dyke <i>et al.</i> (1991)
Crooked Lake	72.666667	-98.283333	102	Dyke <i>et al.</i> (1991)
Cunningham Inlet	73.983333	-93.666667	102	Dyke <i>et al.</i> (1991)
Drake Bay	73.458333	-100.900000	120	Dyke <i>et al.</i> (1991)
Fisher Lake	72.166667	-97.833333	100	Dyke <i>et al.</i> (1991)
Guillimard Bay	71.591667	-97.350000	100	Dyke <i>et al.</i> (1991)
Hollist Point	72.766667	-102.116660	136	Dyke <i>et al.</i> (1991)
Prescott Island	73.016667	-97.050000	107	Dyke <i>et al.</i> (1991)
Resolute Bay	74.712500	-94.866667	120	Dyke <i>et al.</i> (1991)
Rodd Bay	73.926667	-90.625000	76	Dyke <i>et al.</i> (1991)
Russell Island	73.916667	-98.233333	95	Dyke <i>et al.</i> (1991)
Smith Bay	73.066667	-99.466667	100	Dyke <i>et al.</i> (1991)
Stanwell-Fletcher Lake	72.775000	-94.350000	157	Dyke <i>et al.</i> (1991)
Transition Bay	72.091667	-96.550000	115	Dyke <i>et al.</i> (1991)
St Chads	48.685000	-53.778333	38	Dyke (1973), Sommerville (1997)
Fury Point	72.819444	-92.016667	90	Dyke (1979a)
Kangerk Fiord	66.420000	-67.300000	88	Dyke (1979b)
Kangilo Fiord head	66.575000	-67.941667	47	Dyke (1979b)
Kingnait Fiord head	66.350000	-64.350000	27	Dyke (1979b)
Kingnait Fiord mouth West	65.980000	-65.750000	99	Dyke (1979b)
Millut Bay	66.550000	-67.500000	58	Dyke (1979b)
Pangnirtung	66.141667	-65.725000	50	Dyke (1979b)
Pangnirtung Fiord mouth	66.100000	-66.067000	105	Dyke (1979b)
Shark Fiord head	66.700000	-67.150000	100	Dyke (1979b)
Usualuk Valley	66.558333	-66.266667	70	Dyke (1979b)
Cape Garry	72.447222	-93.700000	150	Dyke (1983)
Abernethy River	71.216667	-93.666667	215	Dyke (1984)
Lord Lindsay River	70.010000	-93.500000	156	Dyke (1984)
Pasley Bay	70.420833	-96.016667	136	Dyke (1984)
Pelly Bay	68.966667	-89.983333	250	Dyke (1984)
Shepherd Bay	68.979167	-92.941667	184	Dyke (1984)
Wrottesley Valley	71.250000	-95.300000	155	Dyke (1984)
Griffith Island	74.595000	-95.775000	106	Dyke (1993)

Locality	Latitude	Longitude	Marine Limit	Reference
Lowther Island	74.550000	-97.516667	106	Dyke (1993)
Arthur Fiord	76.455000	-93.696944	80	Dyke (1998)
Barrow Harbour	76.583333	-95.525000	116	Dyke (1998)
Bere Bay	76.857778	-94.232222	99	Dyke (1998)
Cape Hardy	75.773333	-83.854722	114	Dyke (1998)
Cape Home	74.594167	-83.529167	38	Dyke (1998)
Devon Island Southeast	74.750000	-80.150000	0	Dyke (1998)
Devon Island East-central	75.350000	-79.400000	6	Dyke (1998)
Dragleyback Inlet	75.610000	-91.786111	83	Dyke (1998)
Drover Lake	74.903056	-90.578889	65	Dyke (1998)
Firkin Point	75.556944	-85.354444	43	Dyke (1998)
Gascoyne Inlet	74.655000	-91.298333	115	Dyke (1998)
Griffin Inlet	75.188056	-92.013889	91	Dyke (1998)
Inglis Sound	76.375833	-94.922778	91	Dyke (1998)
Lovell Point	74.858889	-91.953056	107	Dyke (1998)
Lyall River	76.960278	-95.254444	117	Dyke (1998)
Lyall River	77.012500	-95.383333	131	Dyke (1998)
Macormick Bay	75.390000	-92.236389	102	Dyke (1998)
Nookap Fiord	75.431389	-87.601667	69	Dyke (1998)
Owen Point	76.072500	-92.365556	84	Dyke (1998)
Porden Point	76.333056	-93.896944	95	Dyke (1998)
Powell Inlet	74.690278	-85.583333	42	Dyke (1998)
Providence Mountain	75.617778	-91.558056	78	Dyke (1998)
Ryder Inlet	74.843889	-88.421111	56	Dyke (1998)
Sandhook Bay	75.790833	-90.072222	94	Dyke (1998)
Sophia Cove	75.133056	-91.772500	67	Dyke (1998)
Stratton Inlet	74.623333	-86.796667	55	Dyke (1998)
Thomas Lee Inlet, main arm	75.342778	-88.633889	79	Dyke (1998)
Thomas Lee Inlet, West Arm	75.541667	-89.991667	76	Dyke (1998)
Triton Bay	76.541389	-92.409167	110	Dyke (1998)
Viks Fiord	75.755556	-91.206667	77	Dyke (1998)
Washington Point	75.775000	-94.350000	110	Dyke (1998)
Whitmore Point	76.959722	-94.874444	114	Dyke (1998)
Wilmer Bay	76.765278	-93.545000	101	Dyke (1998)
Phillips Creek	71.866667	-80.850000	48	Dyke (2000a)
Beta River	72.275000	-81.283333	79	Dyke (2000b)
Koluktoo Bay	72.083333	-81.333333	61	Dyke (2000b)
Lavoie Point	72.900000	-80.541667	61	Dyke (2000b)
Eqalulik River	72.650000	-85.658333	41	Dyke (2000c)
Fitzgerald Bay	72.050000	-89.866667	96	Dyke (2000c)
Fitzgerald Bay	72.016667	-89.883333	102	Dyke (2000c)
Kuuruluk River	72.408333	-86.300000	106	Dyke (2000c)
McBean Bay	72.608333	-89.666667	99	Dyke (2000c)
Tiriganiaaag River	72.208333	-86.483333	98	Dyke (2000c)
Vista River	72.750000	-87.000000	80	Dyke (2000c)
Baillarge Bay	73.216667	-84.216667	40	Dyke (2000d)
Cape Crawford	73.633333	-85.125000	55	Dyke (2000d)
Cape York	73.716667	-87.016667	62	Dyke (2000d)
Stanley Point	73.816667	-85.450000	60	Dyke (2000d)
Victor Bay	73.050000	-85.083333	60	Dyke (2000d)
Cape Charles Yorke	73.725000	-82.866667	58	Dyke (2000e)
Sikosak Bay	70.016000	-83.166667	98	Dyke (2003a)
Gifford River	70.683000	-83.650000	75	Dyke (2004b)
Cape Thalbitzer	69.978333	-79.148055	94	Dyke (2006)
Cockburn Lake	70.450000	-78.666667	54	Dyke (2006)
Rowley River	70.276111	-77.911944	65	Dyke (2006)
Creswell Bay	72.808333	-93.683333	145	Dyke (unpublished)
Nudlukta Inlet	71.458333	-94.483333	192	Dyke (unpublished)
Tuttuturag Lake East	69.400000	-113.366666	130	Dyke (unpublished)
Tuttuturag Lake West	69.416667	-113.916667	130	Dyke (unpublished)
Broughton Island	67.546667	-64.041667	5	England and Andrews (1973)
Alexandra Fiord	78.866667	-76.300000	61	England <i>et al.</i> (2000)
Bartlett Bay	79.183333	-75.000000	88	England <i>et al.</i> (2000)
Beitstad Fiord	79.071667	-78.800000	34	England <i>et al.</i> (2000)

Locality	Latitude	Longitude	Marine Limit	Reference
Flagler Bay	79.100000	-75.950000	83	England <i>et al.</i> (2000)
Herschel Bay	78.600000	-74.750000	117	England <i>et al.</i> (2000)
Jokel Fiord, Sands Glacier	78.950000	-77.916667	50	England <i>et al.</i> (2000)
Knud Peninsula	79.096667	-76.075000	80	England <i>et al.</i> (2000)
Princess Marie Bay	79.466667	-75.583333	88	England <i>et al.</i> (2000)
Ammonite Mountain	77.833333	-87.666666	131	England <i>et al.</i> (2004)
Hook Glacier, opposite	77.510000	-81.721667	105	England <i>et al.</i> (2004)
Piliravijuk Bay	77.333333	-82.083333	102	England <i>et al.</i> (2004)
Schei Point	77.817778	-86.826111	135	England <i>et al.</i> (2004)
Sor Fiord head	77.283000	-84.417000	72	England <i>et al.</i> (2004)
Stenkul Fiord	77.333333	-83.450000	77	England <i>et al.</i> (2004)
Alert	82.450000	-62.750000	122	England (1983)
Bulleys Lump	81.200000	-69.066667	95	England (1983)
Cape Baird	81.550000	-64.500000	120	England (1983)
Daly River	81.233333	-65.866667	127	England (1983)
Fort Conger	81.750000	-64.783333	114	England (1983)
Ida Bay	81.516667	-69.116667	104	England (1983)
James Ross Bay	82.730000	-64.800000	78	England (1983)
Packdog Creek	81.383333	-66.883333	115	England (1983)
Sun Cape	81.666667	-65.333333	114	England (1983)
Atka Elv lower	81.583333	-60.916667	124	England (1985)
Hall Land central	81.650000	-59.966667	140	England (1985)
Newman Bay East	81.816667	-58.666667	139	England (1985)
Antoinette Bay	80.900000	-77.200000	122	England (1990)
Canon Fiord inner East	79.750000	-81.500000	130	England (1990)
Canon Fiord outer East	80.200000	-82.650000	148	England (1990)
Canon Fiord West-central	79.900000	-82.566667	141	England (1990)
d'Iberville Fiord head	80.600000	-78.450000	139	England (1990)
Greely Fiord	80.716667	-80.583333	124	England (1990)
Greely Fiord	80.450000	-80.616667	140	England (1990)
Greely Fiord	80.400000	-81.500000	146	England (1990)
Tanquary Fiord	80.933333	-79.250000	116	England (1990)
Cape Wilkes	80.216667	-70.133333	81	England (1996)
Carl Ritter B, 10 km South	80.783333	-67.916667	122	England (1996)
Carl Ritter B, 26 km South	80.700000	-68.483333	99	England (1996)
Carl Ritter Bay	80.916667	-67.900000	114	England (1996)
Dobbin Bay East	79.816667	-72.633333	83	England (1996)
Dobbin Bay Northeast	79.833333	-73.466667	81	England (1996)
Franklin Pierce Bay	79.533333	-75.000000	92	England (1996)
John Richardson Bay	80.166667	-71.466667	84	England (1996)
Panikpah River	81.050000	-66.633333	119	England (1996)
Radmore Harbour	80.433333	-70.150000	81	England (1996)
Scoresby Bay head	79.900000	-71.500000	84	England (1996)
Albion Lake	82.050000	-87.750000	80	Evans (1990)
Bushmill Pass	81.966667	-87.250000	85	Evans (1990)
Cache Head Fiord	81.950000	-85.916667	86	Evans (1990)
Cape Alfred Ernest	82.333333	-85.416667	65	Evans (1990)
Wind Gap	81.966667	-84.666667	91	Evans (1990)
Tay Sound elbow	72.000000	-79.250000	88	Falconer in Andrews and Drapier (1967)
Tay Sound head	71.933333	-78.583333	78	Falconer in Andrews and Drapier (1967)
Squamish	49.695000	-123.140000	45	Friele and Clague (2002)
Muskrat Falls	53.258333	-60.745833	135	Fulton and Hodgson (1979)
Sandy Point	53.837500	-57.133333	80	Fulton and Hodgson (1979)
Arundel	46.000000	-74.550000	250	Fulton (1987)
Bearbrook	45.391667	-75.341667	210	Fulton (1987)
Campbells Bay	45.750000	-76.600000	178	Fulton (1987)
Clayton	45.180000	-76.330000	168	Fulton (1987)
Duhamel	46.020000	-75.080000	210	Fulton (1987)
Innisville	45.050000	-76.250000	155	Fulton (1987)
Lascelles	45.729167	-75.954167	211	Fulton (1987)
Mallorytown	44.480000	-75.880000	123	Fulton (1987)
Onslow Corners	45.650000	-76.300000	192	Fulton (1987)
Pembroke	45.830000	-77.200000	174	Fulton (1987)
Shawville	45.609722	-76.500000	182	Fulton (1987)

Locality	Latitude	Longitude	Marine Limit	Reference
Smiths Falls	44.900000	-76.020000	134	Fulton (1987)
Val des Bois	45.920000	-75.600000	200	Fulton (1987)
White Lake	45.370000	-76.500000	170	Fulton (1987)
Sukkertoppen Island	65.600000	-52.916667	120	Funder (1989)
Bjorneoer	71.166667	-25.333333	105	Funder (1990)
Danmark Island	70.500000	-26.183333	115	Funder (1990)
Konglomeratelv	71.350000	-24.833333	110	Funder (1990)
Lollandselv	70.950000	-24.116667	80	Funder (1990)
Nathorst Fiord	71.600000	-22.616667	50	Funder (1990)
Ryders Elv	70.866667	-22.483333	44	Funder (1990)
Cape Stang	71.400000	-105.000000	113	Fyles (1963)
Lauchlan River	69.233333	-109.883330	183	Fyles (1963)
Minto Inlet head	71.250000	-115.500000	113	Fyles (1963)
Prince Albert Sound	70.080000	-112.250000	140	Fyles (1963)
Tahoe Lake West	70.100000	-109.833330	160	Fyles (1963)
Washburn Lake	70.100000	-108.500000	159	Fyles (1963)
Pocologan	45.115000	-66.595000	53	Gadd (1973a)
Sheldon Point	45.225000	-66.110000	55	Gadd (1973a)
Pennfield	45.096667	-66.753333	74	Gadd (1973a), Rampton (1984)
Ellice Hills	67.750000	-88.300000	255	Giangioppi <i>et al.</i> (2003)
Covey Hill	45.020000	-73.460000	160	Goldthwait in Gadd (1973b), Pair and Rodrigues (1993)
Les Éboulement	47.466667	-70.333333	170	Govare and Gangloff (1989)
Glenburnie	49.446667	-57.897500	42	Grant (1987)
Green Garden	49.507778	-58.101667	72	Grant (1987)
Lomond	49.453889	-57.751667	43	Grant (1987)
Norris Point	49.531944	-57.861389	90	Grant (1987)
Trout River Pond	49.444167	-58.118333	40	Grant (1987)
Belloni Point	47.666667	-65.566667	50	Grant (1989)
Exploits River	49.063333	-55.555833	50	Grant (1989)
Bell Island	50.750000	-55.600000	136	Grant (1992)
Bradford Bay	51.500000	-57.247222	152	Grant (1992)
Croque	51.056667	-55.846667	137	Grant (1992)
Forteau	51.488333	-56.976667	137	Grant (1992)
L'Anse au Loup	51.533330	-56.783333	145	Grant (1992)
Locks Cove	51.366667	-55.966667	130	Grant (1992)
Pinware Bay	51.658333	-56.683333	135	Grant (1992)
Quirpon Island	51.608333	-55.416667	133	Grant (1992)
Red Bay	51.741667	-56.483333	130	Grant (1992)
St Anthony	51.371389	-55.622500	137	Grant (1992)
Bartletts Harbour	50.900000	-56.750000	140	Grant (1994)
Grand Cove	50.030000	-55.900000	70	Grant (1994)
Jackson's Arm	49.861667	-56.815833	41	Grant (1994)
Parsons Pond	50.080000	-57.600000	106	Grant (1994)
Port au Choix	50.716667	-57.400000	137	Grant (1994)
Western Blue Pond	50.375000	-57.250000	115	Grant (1994)
Akpatok Island	60.570000	-68.000000	81	Gray <i>et al.</i> (1993)
Akpatok Island	60.500000	-67.850000	90	Gray <i>et al.</i> (1993)
Akulivik	60.750000	-78.416667	150	Gray <i>et al.</i> (1993)
Baie-aux-Feuilles Sud	58.600000	-70.000000	183	Gray <i>et al.</i> (1993)
Cap Briard	62.308333	-74.011667	142	Gray <i>et al.</i> (1993)
Cap de la Nouvelle-France	62.416667	-73.800000	182	Gray <i>et al.</i> (1993)
Charles Island	62.666667	-74.100000	160	Gray <i>et al.</i> (1993)
Deception River	62.120000	-74.275000	142	Gray <i>et al.</i> (1993)
Douglas Harbour	62.000000	-73.000000	150	Gray <i>et al.</i> (1993)
Kangirsuk	59.833333	-70.083333	137	Gray <i>et al.</i> (1993)
Kuujuuaq	57.658330	-69.496667	185	Gray <i>et al.</i> (1993)
Povungnituk	60.050000	-76.766667	140	Gray <i>et al.</i> (1993)
Quaqtaq	61.033333	-69.925000	138	Gray <i>et al.</i> (1993)
Sugluk Inlet	62.200000	-75.633333	150	Gray <i>et al.</i> (1993)
Ikudliayuk Lake	60.075556	-64.700000	34	Gray <i>et al.</i> (2000)
Edgell Island	61.775000	-65.000000	21	Gray in Manley and Jennings (1966)
Gould Bay	79.750000	-71.366667	88	Gualtieri and England (1998)
Jyllandselv	70.733333	-24.100000	75	Gulliksen <i>et al.</i> (1991)
Zeballos	49.983333	-126.850000	20	Gutsell <i>et al.</i> (2004)

Locality	Latitude	Longitude	Marine Limit	Reference
Barrow Dome	76.685777	-109.127416	59	Hanson (2003)
Eldridge Bay	76.042222	-109.063638	65	Hanson (2003)
Sabine Bay East	75.609916	-108.511972	61	Hanson (2003)
Sherard Bay	76.051305	-108.852555	64	Hanson (2003)
Weatherall Bay	75.750500	-107.764250	65	Hanson (2003)
Inugsuin Fiord mouth	69.933333	-68.666667	25	Harrison in Andrews and Drapier (1967)
Duart Bay	71.350000	-72.883333	60	Harrison in Andrews and Drapier (1967), Hodgson and Haselton (1974)
Macdonald River	81.400000	-76.916667	86	Hattersley-Smith and Long (1967)
Bull Arm	47.817000	-53.867000	10	Henderson (1972)
Come By Chance	47.850000	-53.983000	10	Henderson (1972)
Long Harbour	47.420000	-53.830000	6	Henderson (1972)
Anse-Pleureuse	49.244167	-65.638889	55	Hétu and Gray (2000)
Marsoui	49.191111	-66.080556	60	Hétu and Gray (2000)
Petite-Valée	49.215278	-65.037500	50	Hétu and Gray (2000)
Rivière-à-Claude	49.223889	-65.875000	55	Hétu and Gray (2000)
Neigette	48.397222	-68.434167	140	Hétu (1998)
Saint-Anaclet	48.483333	-68.377778	145	Hétu (1998)
Richmond Gulf	56.266667	-76.500000	270	Hillaire-Marcel (1980)
Antarctic Dal	72.000000	-23.333333	70	Hjort (1979)
Brogrtdal	73.716667	-24.616667	65	Hjort (1979)
Eskimonaes	74.100000	-21.266667	50	Hjort (1979)
Fleming Fjord	71.883333	-22.916667	60	Hjort (1979)
Foster Bugt	73.450000	-21.783333	75	Hjort (1979)
Holms Bugt	72.516667	-23.966667	110	Hjort (1979)
Kap Laura	72.883333	-23.416667	90	Hjort (1979)
Kap Mackenzie	72.900000	-21.966667	70	Hjort (1979)
Kap Petersens	72.416667	-24.583333	100	Hjort (1979)
Kildedalen	75.250000	-20.916667	50	Hjort (1979)
Permdal	74.400000	-20.250000	50	Hjort (1979)
Peters Bugt So	75.300000	-20.083333	65	Hjort (1979)
Segldal	72.116667	-23.566667	100	Hjort (1979)
Stordalen	73.666667	-22.000000	70	Hjort (1979)
Antarctic Bugt	80.833333	-15.000000	80	Hjort (1979)
Michael River	54.675000	-57.808333	84	Hodgson and Fulton (1972)
Northwest River	53.525000	-60.150000	135	Hodgson and Fulton (1972)
Cambridge Fiord	71.250000	-74.966667	61	Hodgson and Haselton (1974)
Kentra Bay	71.283333	-74.250000	90	Hodgson and Haselton (1974)
Maud Harbour	71.750000	-73.750000	29	Hodgson and Haselton (1974)
Tromso Fiord	71.083000	-73.830000	70	Hodgson and Haselton (1974)
Cape Hatt	72.450000	-79.816667	80	Hodgson and Haselton (1974), Klassen (1993)
Natkusiak Peninsula	72.866667	-110.333330	135	Hodgson and Vincent (1984)
Workshop Point	72.828333	-111.933330	50	Hodgson and Vincent (1984)
Cape Clarendon	74.545000	-111.700000	90	Hodgson <i>et al.</i> (1984)
Cape Phipps	74.617000	-111.167000	34	Hodgson <i>et al.</i> (1984)
Shellabear Point	74.816667	-113.700000	60	Hodgson <i>et al.</i> (1984)
Winter Harbour	74.791667	-110.534160	30	Hodgson <i>et al.</i> (1984)
Brock Island East	77.900000	-113.916660	16	Hodgson <i>et al.</i> (1984)
Lidden Gulf	75.250000	-111.250000	61	Hodgson <i>et al.</i> (1984)
McCormick Inlet	75.800000	-111.916667	53	Hodgson <i>et al.</i> (1984)
Stony Pass	74.916667	-111.500000	55	Hodgson <i>et al.</i> (1984)
Wilkie Point	76.350000	-118.766660	30	Hodgson <i>et al.</i> (1984)
Vendom Fiord	78.116667	-82.166667	70	Hodgson (1973)
King Christian Island	77.753889	-101.616940	80	Hodgson (1977), Atkinson and England (2004)
Great Bear Cove	77.333333	-87.500000	120	Hodgson (1985)
Blakeley Haven	75.950000	-116.250000	51	Hodgson (1992)
Comfort Cove	75.305000	-117.583330	60	Hodgson (1992)
Ibbett Bay	75.800000	-116.250000	60	Hodgson (1992)
Long Point	76.050000	-112.416667	58	Hodgson (1992)
Murray Inlet head	75.500000	-114.000000	55	Hodgson (1992)
Glenelg Bay	72.375000	-109.283333	85	Hodgson (1993)
Glenelg Bay	72.350000	-110.250000	130	Hodgson (1993)
Hadley Bay Northeast	73.175000	-108.116666	70	Hodgson (1993)
Hadley Bay West	72.025000	-108.800000	90	Hodgson (1993)
Kilian Lake	72.183333	-111.900000	120	Hodgson (1993)

Locality	Latitude	Longitude	Marine Limit	Reference
Hadley Bay Northeast	72.550000	-107.750000	90	Hodgson (1994)
Hadley Bay Southeast	72.116667	-107.250000	124	Hodgson (1994)
Stefansson Island Northeast	73.583333	-104.666660	80	Hodgson (1994)
Storkerson Peninsula Northeast	72.966667	-106.133333	80	Hodgson (1994)
Storkerson Peninsula Northeast	73.197250	-105.339110	80	Hodgson (1994)
Barnard Point	72.933333	-113.233333	54	Hodgson (unpublished)
Loch Point	73.100000	-114.183333	120	Hodgson (unpublished)
Loch Point	73.033333	-114.066666	50	Hodgson (unpublished)
Markham Bay	63.936800	-71.846100	72	Hodgson (unpublished)
Prince of Wales Strait, Banks I	73.190316	-116.785466	46	Hodgson (unpublished)
Prince of Wales Strait, Banks I	73.275933	-116.333333	49	Hodgson (unpublished)
Richard Collinson Inlet head	72.516666	-113.750000	90	Hodgson (unpublished)
Richard Collinson Inlet head	72.616666	-114.916666	90	Hodgson (unpublished)
Storkerson Peninsula Southwest	72.116667	-105.433333	85	Hodgson (unpublished)
Autridge Bay	70.133333	-85.266667	119	Hooper (1996), Hooper and Dyke (2000)
Bell Bay	70.750000	-85.300000	92	Hooper (1996), Hooper and Dyke (2000)
Berlinguet Inlet	70.916667	-86.450000	139	Hooper (1996), Hooper and Dyke (2000)
Berlinguet River	71.166667	-86.416667	111	Hooper (1996), Hooper and Dyke (2000)
Bernier Bay East	70.883333	-88.100000	125	Hooper (1996), Hooper and Dyke (2000)
Bernier Bay North-central	71.300000	-88.466667	106	Hooper (1996), Hooper and Dyke (2000)
Bernier Bay Northeast	71.133333	-87.083333	111	Hooper (1996), Hooper and Dyke (2000)
Cape Appel	70.116667	-86.116667	119	Hooper (1996), Hooper and Dyke (2000)
Easter Cape	70.883333	-88.900000	116	Hooper (1996), Hooper and Dyke (2000)
Foss Fiord	70.483333	-87.183333	138	Hooper (1996), Hooper and Dyke (2000)
Morin Point	71.433333	-89.116667	118	Hooper (1996), Hooper and Dyke (2000)
Whyte Inlet	70.183333	-84.683333	114	Hooper (1996), Hooper and Dyke (2000)
Port McNeill	50.566667	-127.017500	92	Howes (1981)
Bloesedalen	69.283333	-53.466667	95	Ingolfsson <i>et al.</i> (1990)
Enoks Havn	69.733333	-54.833333	55	Ingolfsson <i>et al.</i> (1990)
Hareoen	70.383333	-54.950000	60	Ingolfsson <i>et al.</i> (1990)
Walker Arm	70.266667	-71.716667	58	Ives in Andrews and Drapier (1967)
Windless Lake	70.150000	-77.583333	91	Ives (1964), Andrews (1966), Dyke (2006)
Netteling Lake Northwest	67.100000	-71.667000	91	Jackson (personal communication, 2005)
Lewis Bay	63.633333	-68.100000	119	Jacobs <i>et al.</i> (1985)
North Bay River	47.750000	-56.400000	21	Jenness (1960)
Terrenceville	47.600000	-54.700000	18	Jenness (1960), Tucker <i>et al.</i> (1982)
Sandbanks (Webb Bay)	56.817000	-61.750000	41	Johnson (1969)
Kinzarof Lagoon	55.283000	-162.617000	25	Jordan (2001)
Abraham Bay	65.183000	-64.117000	39	Kaplan and Miller (2003)
Aktijartukan Fiord	65.175000	-63.850000	21	Kaplan and Miller (2003)
Brevoort Island	63.333000	-64.167000	32	Kaplan and Miller (2003)
Brevoort Island	63.633000	-64.450000	27	Kaplan and Miller (2003)
Butler Bay	63.200000	-64.933000	47	Kaplan and Miller (2003)
Cape Arnoux	63.217000	-64.600000	42	Kaplan and Miller (2003)
Cape Edwards	64.867000	-65.833000	64	Kaplan and Miller (2003)
Cape Mercy	64.967000	-63.867000	24	Kaplan and Miller (2003)
Cape Mercy North	65.033000	-63.583000	23	Kaplan and Miller (2003)
Chidliak	64.783333	-66.700000	54	Kaplan and Miller (2003)
Cornelius Grinnell Bay	63.750000	-65.167000	61	Kaplan and Miller (2003)
Ikpik Bay	65.383000	-67.417000	69	Kaplan and Miller (2003)
Iqaluit	63.725000	-68.458333	30	Kaplan and Miller (2003)
Iqalujuaq Fiord	65.667000	-65.250000	74	Kaplan and Miller (2003)
Iqalujuaq Fiord Southeast	65.550000	-66.167000	65	Kaplan and Miller (2003)
Kekerton Island	65.700000	-65.833000	102	Kaplan and Miller (2003)
Kingnait Fiord mouth	65.783000	-65.383000	93	Kaplan and Miller (2003)
Kingnait Fiord Southeast	65.600000	-65.250000	72	Kaplan and Miller (2003)
Krumlien Fiord	65.417000	-64.830000	34	Kaplan and Miller (2003)
Krumlien Fiord East	65.283000	-64.830000	37	Kaplan and Miller (2003)
Nettilling Fiord	65.660000	-68.083000	46	Kaplan and Miller (2003)
Nijadluk Harbour	65.133000	-64.083000	44	Kaplan and Miller (2003)
Nuvuk Point	65.117000	-64.567000	38	Kaplan and Miller (2003)
Popham Bay	64.250000	-65.333000	33	Kaplan and Miller (2003)
Resolution Island	61.300000	-64.850000	0	Kaplan and Miller (2003)
Shomeo Point	65.417000	-65.083000	46	Kaplan and Miller (2003)

Locality	Latitude	Longitude	Marine Limit	Reference
West Lynn	42.366667	-71.066667	18	Kaye and Braghorn (1964)
Gunnar Andersson Dal	82.500000	-50.516667	116	Kelly and Bennike (1992)
J P Koch Fjord	82.391667	-40.500000	42	Kelly and Bennike (1992)
Kap Fulford	82.296667	-55.063333	131	Kelly and Bennike (1992)
Kap Wallen	82.250000	-48.583333	108	Kelly and Bennike (1992)
Th Thomsen Fjord	83.050000	-43.400000	100	Kelly and Bennike (1992)
Booth Sound	76.933333	-71.083333	46	Kelly <i>et al.</i> (1999)
Isbjorn O	76.725000	-73.116667	55	Kelly <i>et al.</i> (1999)
Ilerlak	76.666667	-69.416667	46	Kelly <i>et al.</i> (1999)
Narssarssuk	76.455000	-69.283333	37	Kelly <i>et al.</i> (1999)
Saunders Island	76.600000	-69.750000	40	Kelly <i>et al.</i> (1999)
Wolstenholm Fjord	76.666667	-68.633333	35	Kelly <i>et al.</i> (1999)
Nisip kua	67.233333	-53.783333	140	Kelly (1973)
Ameralik	64.333333	-50.400000	80	Kelly (1985)
Imarngit	64.300000	-52.066667	90	Kelly (1985)
Marraq	63.428333	-51.201667	70	Kelly (1985)
Mellebygd	62.066667	-49.333333	53	Kelly (1985)
Melville Bugt	76.000000	-65.500000	17	Kelly (1985)
Narssaq	60.908333	-46.066667	52	Kelly (1985)
Qeqertat	77.500000	-66.666667	72	Kelly (1985)
Upernavik	72.250000	-56.000000	21	Kelly (1985)
Asiak River	67.672800	-114.481000	170	Kerr <i>et al.</i> (1997)
Buchanan River	69.766667	-121.666660	50	Kerr (1994)
Cape Parry	70.000000	-125.000000	10	Kerr (1994)
Coppermine River	67.730000	-115.417500	170	Kerr (1994)
Darnley Bay	69.583333	-123.133330	25	Kerr (1994)
Bathurst Inlet head	66.500000	-109.000000	223	Kerr (1996)
Bathurst Inlet head	66.000000	-106.500000	228	Kerr (1996)
Bathurst Inlet West	67.500000	-111.000000	210	Kerr (1996)
Bathurst Inlet West	67.750000	-110.000000	209	Kerr (1996)
Croker River	69.100000	-119.500000	84	Kerr (1996)
Isabella Bay	69.466667	-68.866667	42	King (1969)
Sundance	56.520000	-94.080000	125	Klassen (1986)
Nelson River	56.416667	-94.216667	125	Klassen (1986), Dredge and Nixon (1992)
Pond Inlet	72.700000	-77.966667	50	Klassen (1993)
Cocheco	43.229700	-70.938300	89	Koteff <i>et al.</i> (1993)
Dayton	43.550000	-70.576000	84	Koteff <i>et al.</i> (1993)
Exeter	42.981400	-70.948300	41	Koteff <i>et al.</i> (1993)
Haverhill	42.758333	-71.031944	29	Koteff <i>et al.</i> (1993)
Ipswich	42.679167	-70.841667	15	Koteff <i>et al.</i> (1993)
Lee	43.123000	-71.012000	60	Koteff <i>et al.</i> (1993)
Newburyport	42.816700	-70.916700	28	Koteff <i>et al.</i> (1993)
Rowley	42.717000	-70.879170	20	Koteff <i>et al.</i> (1993)
Sanford	43.439170	-70.774700	79	Koteff <i>et al.</i> (1993)
Waterboro	43.535500	-70.715600	91	Koteff <i>et al.</i> (1993)
Upper Charlo	48.001389	-66.477778	53	Lamothe (1992)
Cape Butler	77.513333	-95.566667	121	Lamoureux and England (2000)
Cornwall Island	77.780833	-94.958333	115	Lamoureux and England (2000)
Nordpasset	82.970000	-37.731667	50	Landvik <i>et al.</i> (2001)
Fladebugt	77.266667	-19.466667	54	Landvik (1994)
Hvalrosodden	76.933333	-20.250000	42	Landvik (1994)
Notre-Dame-des Laurentides	46.907500	-71.298889	200	LaSalle and Shilts (1993)
Saint-Henri-de-Lévis	46.637500	-71.133333	200	LaSalle and Shilts (1993)
Aupaluk	59.250000	-69.800000	152	Lauriol (1982)
Baie-aux-Feuilles nordest	58.900000	-69.450000	178	Lauriol (1982)
Koksoak	58.250000	-68.300000	155	Lauriol (1982)
Lac Ballantyne	58.400000	-69.200000	150	Lauriol (1982)
Lac Bassingnac	58.050000	-70.100000	176	Lauriol (1982)
Lac Chavigny ouest	58.000000	-75.500000	170	Lauriol (1982)
Rivière Arnaud est	59.950000	-70.000000	140	Lauriol (1982)
Rivière Arnaud	59.700000	-72.750000	120	Lauriol (1982)
Rivière aux Feuilles ouest	58.250000	-71.950000	159	Lauriol (1982)
Rivière Méléze	57.250000	-70.750000	195	Lauriol (1982)
Rivière Méléze-2	57.500000	-69.900000	195	Lauriol (1982)

Locality	Latitude	Longitude	Marine Limit	Reference
Digges Island	62.577222	-78.090278	168	Laymon (1988)
Foxe Peninsula	64.316667	-76.566667	187	Laymon (1988)
Foxe Peninsula	64.266667	-76.233333	195	Laymon (1988)
Ivujivik Harbour	62.400000	-77.750000	152	Laymon (1988)
Nottingham Island	63.433333	-77.916667	176	Laymon (1988)
Salisbury Island	63.583333	-77.233333	150	Laymon (1988)
Harbour Breton	47.510000	-55.826667	23	Leckie and McCann (1983)
South Henik Lake	61.250000	-96.500000	159	Lee (1959)
Carr Lake	62.166667	-95.683333	171	Lee (1959, 1968)
Chesterfield Inlet South	63.250000	-91.600000	188	Lee (1959), Prest <i>et al.</i> (1968)
Trois-Pistoles	48.128333	-69.133333	168	Lee (1963)
Baker Lake	64.516667	-96.050000	130	Lee (1968)
Kazan River	63.766667	-95.666667	137	Lee (1968)
Mistake Creek	64.316667	-88.483333	148	Lee (1968)
Expedition Fiord	79.333333	-91.383333	93	Lemmen <i>et al.</i> (1994)
Expedition River	79.400000	-90.733333	102	Lemmen <i>et al.</i> (1994)
Strand Fiord head	79.250000	-90.283333	124	Lemmen <i>et al.</i> (1994)
Strand Fiord mouth	79.166667	-91.783333	105	Lemmen <i>et al.</i> (1994)
Cape Discovery	83.050000	-76.133333	68	Lemmen (1989)
Disraeli Creek	82.950000	-74.033333	78	Lemmen (1989)
Disraeli Fiord centre	82.800000	-73.850000	97	Lemmen (1989)
Marvin Peninsula	83.016667	-74.850000	74	Lemmen (1989)
M'Clintock Inlet	82.633333	-75.616667	122	Lemmen (1989)
Eggleston Bay	63.216667	-68.221667	104	Lind in Andrews and Short (1983)
Bay d'Espoir	47.900000	-55.791667	25	Liverman (1994)
Musgrave Harbour	49.450000	-53.970000	57	Liverman (1994)
Port Blandford	48.350000	-54.170000	30	Liverman (1994)
Saint-Fabien	48.306944	-68.853333	155	Locat (1977)
Sam Ford Fiord	70.216667	-71.300000	64	Loken in Andrews and Drapier (1967)
Eclipse Channel	59.783333	-64.266667	56	Loken (1962)
Ikudliayuk Fiord outer	60.075556	-64.500000	26	Loken (1962)
Ryans Bay head	59.550000	-64.100000	64	Loken (1962)
Port Burwell	60.416667	-64.816667	15	Loken (1962), Prest <i>et al.</i> (1968), Vincent (1989)
Akulliit 4	68.671167	-51.116667	85	Long and Roberts (2003)
Umiivik	68.533333	-52.850000	112	Long and Roberts (2003)
Arvenprinsen Ejland	69.761111	-51.241667	73	Long <i>et al.</i> (1999)
Innaarsuit	68.616667	-52.100000	110	Long <i>et al.</i> (2003)
Bond Inlet	62.205000	-67.846667	46	Manley and Miller (2001)
Jackman Sound	62.358333	-66.483333	86	Manley and Miller (2001)
Nobel Inlet	62.091667	-66.133333	42	Manley and Miller (2001)
Pritzler Harbour	62.116667	-67.350000	38	Manley and Miller (2001)
York Sound	62.408333	-66.483333	80	Manley and Miller (2001)
Balcom Inlet	62.295000	-68.591667	67	Manley in Manley and Jennings (1996)
Pike Island	63.223333	-67.953333	123	Manley in Manley and Jennings (1996)
Porter Inlet	63.610000	-68.173333	96	Manley in Manley and Jennings (1996)
Pugh Island	63.206667	-68.061667	121	Manley in Manley and Jennings (1996)
Bruce Harbour	62.773333	-70.101667	98	Manley in McNeely (2002)
Ashe Inlet	62.600000	-70.666667	112	Manley (1996)
Big Island	62.558333	-70.273333	115	Manley (1996)
Canon Inlet	63.075000	-71.350000	138	Manley (1996)
Lake Harbour	62.783333	-69.833333	95	Manley (1996)
Soper Lake	62.891667	-69.841667	91	Manley (1996)
Soper Valley	62.968333	-69.788333	102	Manley (1996)
Chichagof Island	58.233333	-135.750000	80	Mann (1986)
Lac J'Arrive	49.248889	-65.376389	56	Marcoux and Richard (1995)
Websters Corners	49.233333	-122.493330	200	Mathews <i>et al.</i> (1970), Clague <i>et al.</i> (1982)
Alberny	49.253333	-124.826660	91	Mathews <i>et al.</i> (1970), Clague (1981)
Courtney	49.645000	-125.005000	150	Mathews <i>et al.</i> (1970), Clague (1981)
Englishman River	49.283333	-124.266660	140	Mathews <i>et al.</i> (1970), Clague (1981)
Baie Oblongue	62.450000	-76.600000	136	Mathews in Andrews and Drapier (1967)
Eric Cove	62.550000	-77.383333	170	Mathews (1967), Gray <i>et al.</i> (1993)
Sops Arm	49.725000	-56.928333	60	McCuaig (2003)
Western Arm	49.830000	-56.550000	70	McCuaig (2003)
Sainte-Christine	45.600000	-72.441667	165	McDonald (1969)

Locality	Latitude	Longitude	Marine Limit	Reference
Towson Point	75.883333	-105.583330	101	McLaren and Barnett (1978)
Tingmisut Lake	75.950000	-107.783330	82	McLaren and Barnett (1978) (suspect: cf Hanson, 2003)
Nias Point	75.506667	-108.250000	55	McLaren and Barnett (1978), Hodgson <i>et al.</i> (1984)
Brodie Bay	67.916667	-66.616667	54	Mears in Andrews and Miller (1972)
Scott Inlet	71.200000	-71.366667	46	Miller <i>et al.</i> (1977)
Confederation Fiord	68.200000	-67.383333	43	Miller in Andrews (1975)
Kangetokjuak Fiord head	66.583333	-62.950000	24	Miller in Andrews (1975)
North Pangnirtung Fiord	66.950000	-64.650000	15	Miller in Andrews (1975)
Itirbilung Fiord	69.316667	-68.100000	54	Miller in Andrews (1976)
Newton Fiord	63.116667	-66.216667	70	Miller in Kaufman and Williams (1992)
Juneau	58.333333	-134.434720	230	Miller (1973)
Hamlen Bay	63.073333	-66.458333	81	Miller (1979)
Baere Sound	62.500000	-64.833333	46	Miller (1980)
Gold Cove	62.950000	-65.833333	74	Miller (1980)
Peter Force Sound	63.016667	-65.783333	75	Miller (1980)
Rivière Bastican	46.570833	-72.420833	200	Occhietti (1976)
Rivière La Fourche	46.534722	-72.654167	200	Occhietti (1976)
Bay Fiord	78.916667	-85.216667	120	O'Cofaigh <i>et al.</i> (2000)
Bear Corner	78.116667	-87.450000	142	O'Cofaigh <i>et al.</i> (2000)
Blind Fiord middle	78.233333	-85.950000	133	O'Cofaigh <i>et al.</i> (2000)
Blind Fiord mouth	78.133333	-86.666667	138	O'Cofaigh <i>et al.</i> (2000)
Irene Bay	79.016667	-81.466667	75	O'Cofaigh <i>et al.</i> (2000)
Jaeger Bay	78.050000	-84.783333	106	O'Cofaigh <i>et al.</i> (2000)
Starfish Bay head	78.200000	-84.000000	86	O'Cofaigh <i>et al.</i> (2000)
Starfish Bay mouth	78.150000	-84.983333	110	O'Cofaigh <i>et al.</i> (2000)
Stor Island	78.883333	-86.233333	151	O'Cofaigh <i>et al.</i> (2000)
Strathcona Fiord	78.700000	-82.850000	102	O'Cofaigh <i>et al.</i> (2000)
Strathcona Fiord	78.750000	-83.383333	122	O'Cofaigh <i>et al.</i> (2000)
Trappers Cove	78.650000	-86.716667	118	O'Cofaigh <i>et al.</i> (2000)
Trold Fiord mouth	78.100000	-85.466667	143	O'Cofaigh <i>et al.</i> (2000)
Côte Verte	49.400000	-63.580000	80	Painchaud <i>et al.</i> (1984)
Falaise Ste-Marie	49.666389	-63.912500	80	Painchaud <i>et al.</i> (1984)
Black Lake	44.500000	-75.550000	120	Pair and Rodrigues (1993)
Malone	44.850000	-74.300000	148	Pair and Rodrigues (1993)
Adamsville	45.283333	-72.783333	165	Parent and Occhietti (1988)
Saint-Dominique	45.316667	-74.150000	180	Parent and Occhietti (1988)
Warwick	45.943056	-72.002500	175	Parent and Occhietti (1988)
Narpaing Fiord central	67.791667	-65.616667	46	Pheasant and Andrews (1973)
Narpaing Fiord head	67.583333	-65.416667	17	Pheasant and Andrews (1973)
Okoa Bay mouth	67.900000	-66.183333	48	Pheasant and Andrews (1973)
Quajon Fiord head	67.616667	-65.166667	34	Pheasant and Andrews (1973)
Baie Verte	49.910000	-56.275833	61	Prest <i>et al.</i> (1968)
Borden-Carleton	46.250000	-63.700000	0	Prest <i>et al.</i> (1968)
Cape Bathurst	70.700000	-128.300000	0	Prest <i>et al.</i> (1968)
Chicoutimi	48.250000	-71.100000	167	Prest <i>et al.</i> (1968)
Duffy Lake	62.816667	-94.800000	168	Prest <i>et al.</i> (1968)
Emerald Island	76.700000	-114.000000	27	Prest <i>et al.</i> (1968)
Frozen Strait	66.000000	-86.500000	141	Prest <i>et al.</i> (1968)
Kensington	46.450000	-63.750000	3	Prest <i>et al.</i> (1968)
Kuugaq River	62.140278	-77.879167	167	Prest <i>et al.</i> (1968)
Lennox	46.600000	-63.850000	9	Prest <i>et al.</i> (1968)
Magdalen Islands	47.250000	-61.900000	37	Prest <i>et al.</i> (1968)
Meighen Island	79.900000	-100.000000	24	Prest <i>et al.</i> (1968)
Mount George	68.658333	-107.016660	195	Prest <i>et al.</i> (1968)
Netteling Lake	66.000000	-71.750000	97	Prest <i>et al.</i> (1968)
Parsons Point	49.033333	-53.866667	40	Prest <i>et al.</i> (1968)
Pugwash	45.900000	-63.700000	0	Prest <i>et al.</i> (1968)
Stewart	56.000000	-130.000000	148	Prest <i>et al.</i> (1968)
Truro	45.200000	-63.400000	0	Prest <i>et al.</i> (1968)
Wager Bay head	65.500000	-89.800000	114	Prest <i>et al.</i> (1968)
Wager Bay mouth	65.500000	-87.500000	133	Prest <i>et al.</i> (1968)
Murray Maxwell Bay East	70.050000	-80.220000	88	Prest <i>et al.</i> (1968), Craig (unpublished map), Dyke (2003)
Siorarsuk Peninsula	70.017000	-81.530000	95	Prest <i>et al.</i> (1968), Craig (unpublished map), Dyke (2003)
Darnley Bay Southwest	69.300000	-124.500000	26	Prest <i>et al.</i> (1968), Kerr (1996)

Locality	Latitude	Longitude	Marine Limit	Reference
Victoria	48.413333	-123.355000	75	Prest <i>et al.</i> (1968), Mathews <i>et al.</i> (1970), Clague (1981)
Sabine Peninsula Northeast	76.750000	-108.500000	40	Prest <i>et al.</i> (1968), McLaren and Barnett (1978)
Devels Back Brook	46.900000	-65.500000	64	Prest <i>et al.</i> (1968), Rampton <i>et al.</i> (1984)
Brier Island	44.245833	-66.388333	45	Prest <i>et al.</i> (1972)
Digby	44.620000	-65.760000	40	Prest <i>et al.</i> (1972)
Humber Gorge	48.948333	-57.846667	49	Prest <i>et al.</i> (1972)
Red Head	43.900000	-66.250000	0	Prest <i>et al.</i> (1972)
Salmon River	44.050000	-66.170000	10	Prest <i>et al.</i> (1972)
Dundas Harbour	74.500000	-82.500000	26	Prest (1952), Prest <i>et al.</i> (1968)
Miminegesh	46.866667	-64.233333	24	Prest (1973)
Flatland	48.000000	-66.750000	47	Rampton <i>et al.</i> (1984)
Kierstead	45.500000	-65.900000	60	Rampton <i>et al.</i> (1984)
Waterside	45.600000	-64.750000	33	Rampton <i>et al.</i> (1984)
Wirral	45.250000	-66.250000	58	Rampton <i>et al.</i> (1984)
Zealand	46.000000	-67.000000	73	Rampton <i>et al.</i> (1984)
Kalifonsky Beach	60.500000	-151.333330	25	Reger <i>et al.</i> (1996)
Beaufort Lakes	81.880000	-63.330000	116	Retelle (1986)
Spear Island	47.100000	-52.750000	11	Rogerson and Tucker (1972)
The Backway	54.083333	-58.116667	90	Rogerson (1977)
Sandwich Bay mouth	53.600000	-57.250000	113	Rogerson (1977), Vincent (1989)
Read Island, 55 km East	69.066667	-112.450000	140	Sharpe (1992)
Butterfly Lake	69.350000	-75.816667	94	Sim (1964)
Isortoq Fiord head	69.950000	-76.900000	73	Sim (1964), Andrews (1966)
Isortoq Fiord mouth	69.870000	-77.250000	89	Sim (1964), Andrews (1966)
Tikerarsuk Point	69.416667	-76.400000	94	Sim (1964), Andrews (1966), King and Buckley (1967)
Ekwan River	53.533333	-86.050000	167	Skinner (1973)
Moose River	50.000000	-83.000000	140	Skinner (1973)
Otter Rapids	50.275000	-81.650000	164	Skinner (1973), Dredge and Cowan (1989)
Clyde Inlet mouth	70.150000	-68.933333	34	Smith in Andrews and Drapier (1967)
Sam Ford Fiord head	70.000000	-71.616667	66	Smith in Andrews and Drapier (1967)
Chandler Fiord	81.716667	-69.383333	87	Smith (1999)
Traytown	48.666667	-53.966667	39	Sommerville (1997)
Spencers Island	45.358611	-64.708889	32	Stea and Wightman (1987)
Fort Williams	44.950000	-64.300000	0	Stea <i>et al.</i> (2001)
Murray Beach	46.000000	-64.250000	15	Stea <i>et al.</i> (2001)
Sandy Cove	44.500000	-65.900000	41	Stea <i>et al.</i> (2001)
Burlington	44.466700	-73.200000	104	Stewart and MacClintock (1969)
Charlotte	44.300000	-73.250000	84	Stewart and MacClintock (1969)
East Highgate	44.916700	-72.983300	153	Stewart and MacClintock (1969)
Vergennes	44.166700	-73.250000	75	Stewart and MacClintock (1969)
West Bridport	43.900000	-73.383300	67	Stewart and MacClintock (1969)
Merrimac	42.830000	-71.000000	32	Stone and Peper (1982)
Quincy	42.250000	-71.000000	0	Stone and Peper (1982)
Clifton Point	69.134722	-118.584440	100	St-Onge and McMartin (1995)
Harding River	68.783333	-116.933330	130	St-Onge and McMartin (1995)
Richardson River	67.866667	-117.166660	150	St-Onge and McMartin (1995)
Bernard Harbour	68.542222	-115.084440	137	St-Onge and McMartin (1995), Kerr (1996)
Coutts Inlet	71.450000	-76.333333	72	Stravers and Syvitski (1991)
Feachem Valley	71.900000	-74.300000	34	Stravers and Syvitski (1991)
Omega Bay	71.450000	-74.866667	73	Stravers and Syvitski (1991)
Paquet Bay	71.716667	-77.700000	76	Stravers and Syvitski (1991)
Paquet Bay	72.000000	-79.250000	88	Stravers and Syvitski (1991)
Rannock Arm	71.450000	-75.133333	83	Stravers and Syvitski (1991)
Charles Francis Hall Bay	62.650000	-66.750000	70	Stravers <i>et al.</i> (1992)
Kendall Strait	62.156667	-66.040000	50	Stravers <i>et al.</i> (1992)
Midnight Harbour	62.483333	-66.500000	94	Stravers <i>et al.</i> (1992)
Promontory Bay North	62.583333	-66.616667	75	Stravers <i>et al.</i> (1992)
Angujaetorfiup kua	66.716667	-51.400000	115	Ten Brink (1974)
Aussivit	66.566667	-52.400000	125	Ten Brink (1974)
Tatsip ata	66.833333	-51.083333	100	Ten Brink (1974)
Umivit	66.833333	-50.716667	65	Ten Brink (1974)
Augusta	44.315566	-69.792694	105	Thompson <i>et al.</i> (1989)
Concord	44.994050	-69.878447	129	Thompson <i>et al.</i> (1989)
Dolby Pond	45.666488	-68.630433	113	Thompson <i>et al.</i> (1989)

Locality	Latitude	Longitude	Marine Limit	Reference
Hampden	44.710603	-68.881272	97	Thompson <i>et al.</i> (1989)
Lake Auburn	44.129853	-70.238983	104	Thompson <i>et al.</i> (1989)
Mount Desert	44.312591	-68.248275	71	Thompson <i>et al.</i> (1989)
Norridgewock	44.723800	-69.822266	123	Thompson <i>et al.</i> (1989)
Pineo Ridge East	44.669450	-67.833961	77	Thompson <i>et al.</i> (1989)
Round Lake	45.030716	-67.256727	59	Thompson <i>et al.</i> (1989)
Searsport	44.451538	-68.959733	89	Thompson <i>et al.</i> (1989)
Port Gamble	47.900000	-122.600000	30	Thorson (1980)
Seattle	47.600000	-122.333333	0	Thorson (1980)
Burin Peninsula West	47.400000	-55.250000	16	Tucker <i>et al.</i> (1982)
Fortune	46.900000	-55.950000	6	Tucker <i>et al.</i> (1982)
Marystown	47.200000	-55.000000	5	Tucker <i>et al.</i> (1982)
Halls Bay	49.483333	-56.191667	76	Tucker (1974)
Botwood	49.100000	-55.366667	53	Twenhofel (1947), Jenness (1960)
Bonaventure	48.073611	-65.497222	46	Veillette and Cloutier (1993)
Cap Rosier	44.312778	-68.829167	75	Veillette and Cloutier (1993)
Grande Rivière	48.395000	-64.513333	38	Veillette and Cloutier (1993)
Nouvelle	48.133333	-66.291667	55	Veillette and Cloutier (1993)
Restigouche	48.048333	-66.700556	63	Veillette and Cloutier (1993)
Rivière au Renard	48.987500	-64.418333	38	Veillette and Cloutier (1993)
Sainte-Anne-des-Monts	49.119444	-66.488889	75	Veillette and Cloutier (1993)
Sainte-Blandine	48.397222	-68.433333	140	Veillette and Cloutier (1993)
La Grand Rivière	53.583333	-77.500000	270	Vincent (1977)
Mercy Bay	74.025000	-118.908333	30	Vincent (1983)
Pennell Point	73.916667	-124.000000	20	Vincent (1983)
Sachs Harbour	71.950000	-125.416667	20	Vincent (1983), Dyke and Dredge (1989)
Eastmain River	52.222222	-77.916667	270	Vincent (1989)
Harricana River	50.500000	-78.800000	213	Vincent (1989)
James Bay East	54.300000	-76.250000	268	Vincent (1989)
La Grande Rivière	53.600000	-75.250000	246	Vincent (1989)
Matagami-LG2 road	52.216667	-77.133333	270	Vincent (1989)
Matagami-LG2 road	53.350000	-77.566667	270	Vincent (1989)
Métabetchouan	48.433333	-71.850000	198	Vincent (1989)
Poste-de-la-Baleine	55.283333	-77.766667	270	Vincent (1989)
Graveyard Bay West	70.650000	-116.371660	90	Vincent (unpublished)
Mount Pelly	69.150000	-104.900000	190	Washburn (1947)